THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CIX. No. 2442.] LONDON, MARCH 1, 1910. [62ND YEAR. PRICE 6d.

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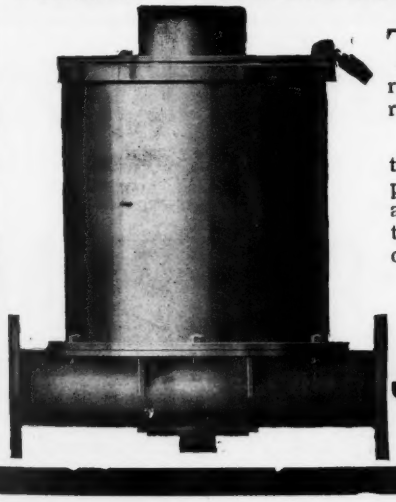

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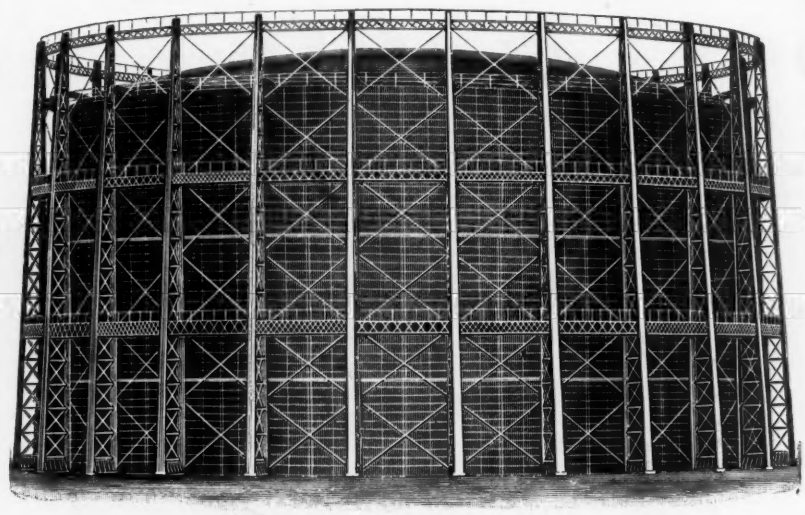

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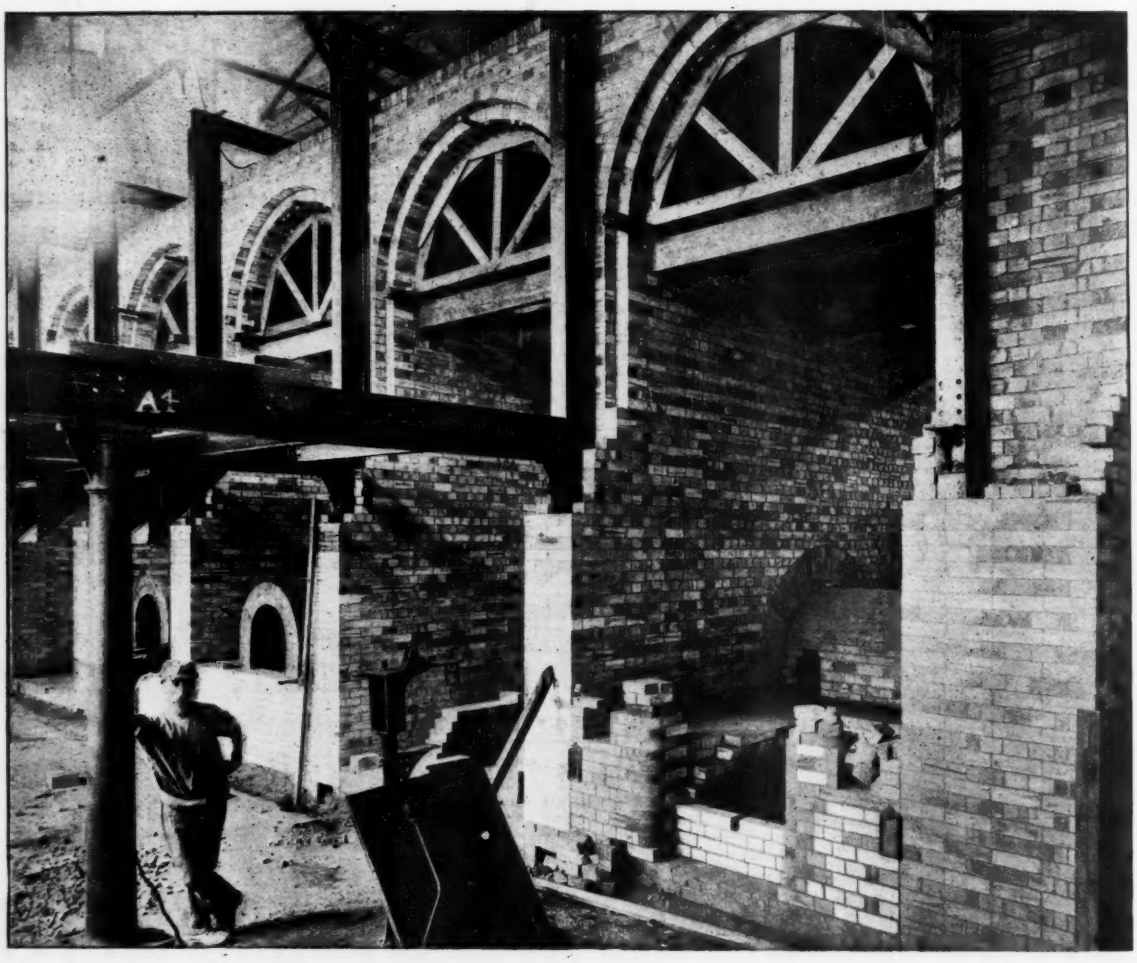

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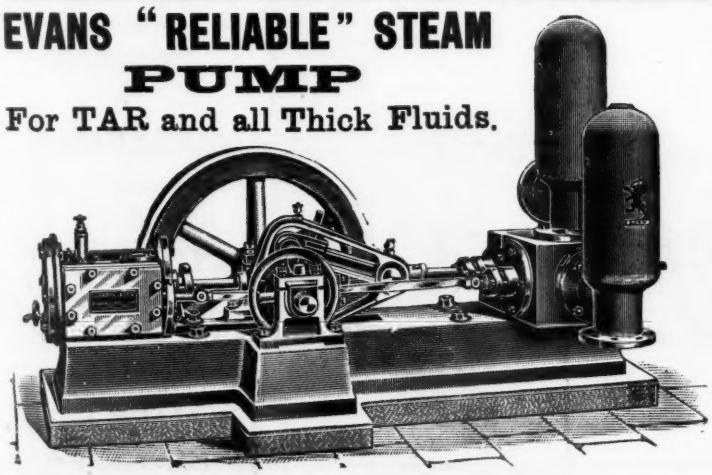

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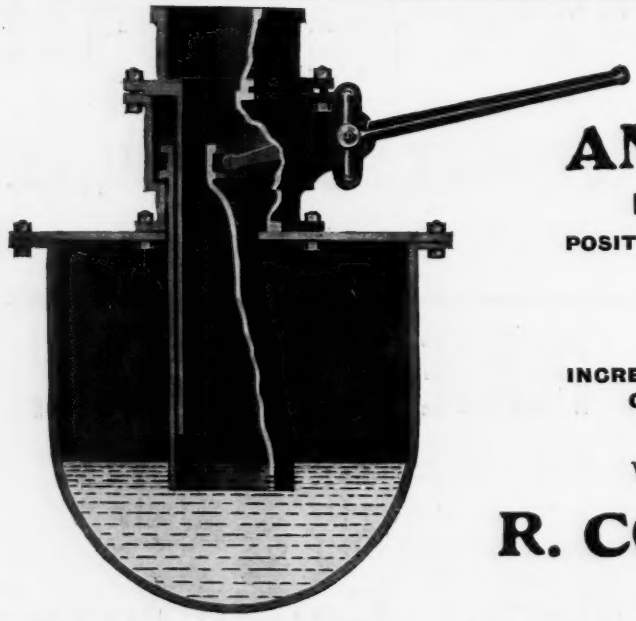

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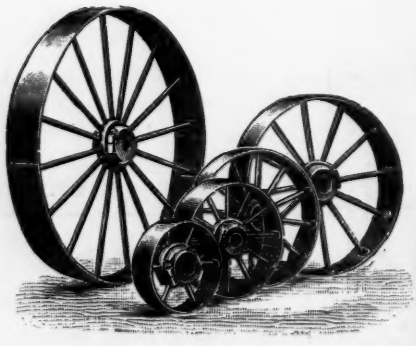

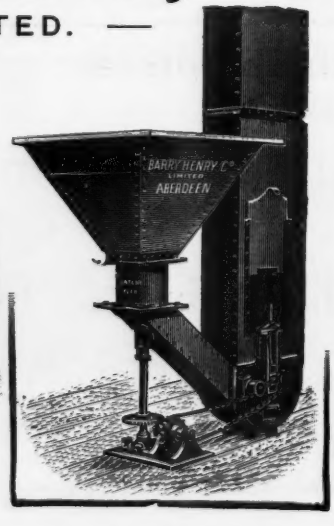

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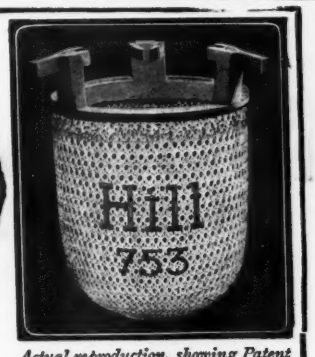

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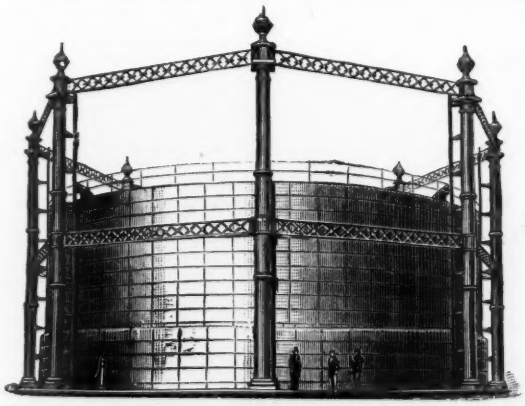

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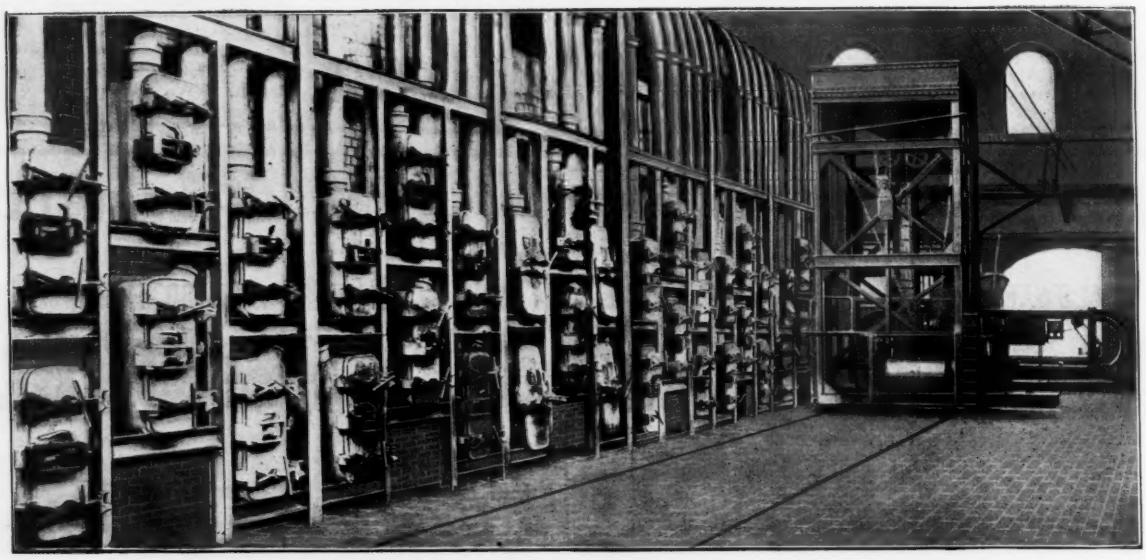

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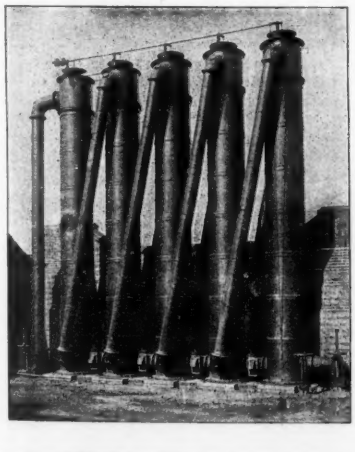

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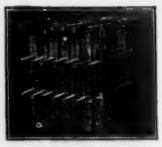

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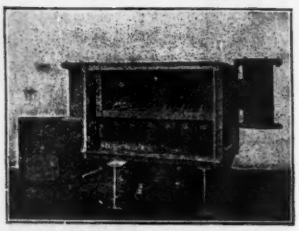

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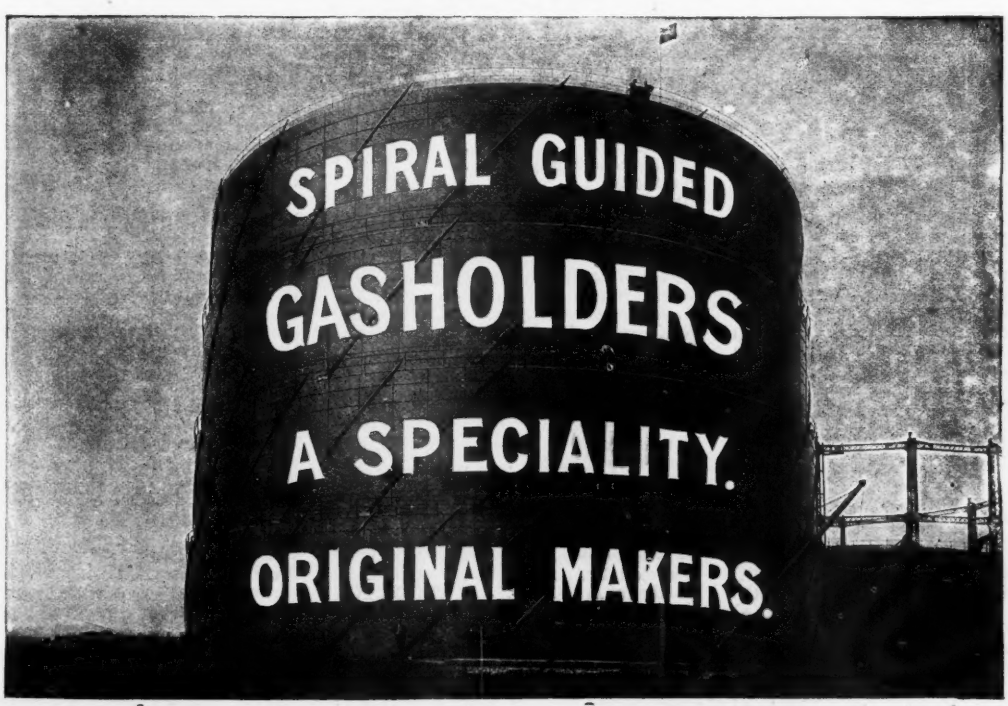

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Belfast	1,700,000	Gelsenkirchen, Westphalia	175,000	Revel, Russia	350,000
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Bognor	100,000	Hampton Court (2nd)	600,000	St. Joseph, Mo.	750,000
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Bournemouth (2nd)	500,000	Heidelberg, Germany	200,000	Scarborough	800,000
Bremen, Germany	550,000	Holyoke, Mass.	600,000	Schwelm, Westphalia	100,000
Bremen (2nd)	950,000	Hong Kong	450,000	Shanghai	225,000
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Brentford	1,200,000	Ilford	650,000	Shanghai (3rd)	1,600,000
Brentford (2nd)	850,000	Innsbruck, Austria	200,000	Southampton	800,000
Bridgwater	200,000	Ipswich	750,000	Southampton (2nd)	500,000
Bridlington	150,000	Kampen, Holland	350,000	Southampton (3rd)	600,000
Bridlington (2nd)	200,000	Kiel, Sleswig	1,000,000	Southgate	400,000
Brieg, Silesia	100,000	Kiel (2nd)	880,000	Southport	750,000
Brighton	1,750,000	L. & N.W. Rly., Crewe	700,000	Southport (2nd)	900,000
Brighton (2nd)	1,850,000	Lausanne, Switz.	250,000	South Shields	650,000
Bromley	1,500,000	Lawrence, Mass.	400,000	Stafford	500,000
Bruges, Belgium	200,000	Lea Bridge	350,000	Staines	600,000
Brussels—Anderlecht	350,000	Lea Bridge (2nd)	350,000	Stettin, Germany	880,000
Brussels—Anderlecht (2nd)	350,000	Lea Bridge (3rd)	400,000	Stockholm	1,500,000
Brussels—Forest	1,000,000	Lea Bridge (4th)	1,000,000	Stockholm (2nd)	1,750,000
Brussels—Koekelberg	1,000,000	Leeuwarden, Holland	400,000	Stockport	600,000
Brussels—St. Gilles	1,000,000	Leiden, Holland	500,000	Stockport (2nd)	600,000
Brussels—St. Josse	1,000,000	Leiden (2nd)	575,000	Stockport (3rd)	400,000
Brussels—St. Josse (2nd)	600,000	Leigh, Lancs.	350,000	Stockton-on-Tees	500,000
Brussels—Ville	750,000	Lemberg, Galicia	260,000	Swansea	750,000
Brussels—Ville (2nd)	750,000	Lemberg (2nd)	500,000	Swansea (2nd)	1,000,000
Brussels—Ville (3rd)	1,500,000	Liége, Belgium	1,000,000	Swansea (3rd)	450,000
Brussels—Ville (4th)	350,000	Liége (2nd)	750,000	Swindon	300,000
Bucarest, Roumania	1,100,000	Lincoln	500,000	Sydney—Harbour	500,000
Budapest, Hungary	50,000	Liverpool	3,500,000	Sydney—Harbour (2nd)	500,000
Budapest (2nd)	1,750,000	Liverpool (2nd)	4,500,000	Sydney—Mortlake	500,000
Carlisle	600,000	Longton	600,000	Sydney—Mortlake (2nd)	500,000
Carlsruhe, Germany	500,000	Louvain, Belgium	800,000	Syracuse, N.Y.	850,000
Chigwell	350,000	Lübeck, Germany	400,000	Taunton	225,000
Chorley	300,000	Maastricht, Holland	200,000	Taunton (2nd)	350,000
Commercial, London	850,000	Magdeburg, Germany	1,400,000	The Hague Holland	1,000,000
Commercial (2nd)	850,000	Maidenhead	225,000	The Hague (2nd)	500,000
Commercial (3rd)	1,250,000	Maidenhead (2nd)	225,000	Tilburg, Holland	400,000
Commercial (4th)	2,000,000	Maidstone	500,000	Torquay	350,000
Copenhagen	700,000	Malines, Belgium	500,000	Tottenham	750,000
Copenhagen (2nd)	2,500,000	Malmö, Sweden	350,000	Tottenham (2nd)	750,000
Courtrai, Belgium	250,000	Malta	400,000	Tottenham (3rd)	350,000
Coventry	600,000	Manchester	3,500,000	Tottenham (4th)	1,000,000
Coventry (2nd)	600,000	Manchester (2nd)	3,500,000	Tottenham (5th)	1,000,000
Cracow, Galicia	200,000	Marlborough	100,000	Tottenham (6th)	1,250,000
Cracow (2nd)	200,000	Mayence, Germany	700,000	Tunbridge Wells	1,000,000
Crefeld, Germany	500,000	McKeesport, Pa.	500,000	Utrecht, Holland	1,000,000
Croydon	1,250,000	Merthyr Tydfil	300,000	Utrecht (2nd)	1,000,000
Croydon (2nd)	625,000	Middlesbrough	1,250,000	Verviers, Belgium	1,000,000
Croydon (3rd)	625,000	Namur, Belgium	175,000	Vienna	3,500,000
Croydon (4th)	550,000	Nelson	400,000	Vienna (2nd)	2,500,000
Debreczin, Hungary	100,000	Newburgh, N.Y.	600,000	Waltham	400,000
Deventer, Holland	150,000	New York	5,200,000	Wandsworth & Putney	1,800,000
Deventer (2nd)	200,000	Nictheroy, Brazil	250,000	Watford	300,000
Dorking	150,000	North Middlesex	150,000	Watford (2nd)	350,000
Dublin	2,000,000	North Middlesex (2nd)	200,000	Wellington, N.Z.	350,000
Dublin (2nd)	2,000,000	North Middlesex (3rd)	75,000	West Bromwich	550,000
Dublin (3rd)	650,000	Norwich	1,000,000	West Ham	1,500,000
Dundee	1,500,000	Norwich (2nd)	300,000	West Ham (2nd)	800,000
Dunedin, N.Z.	150,000	Norwich (3rd)	500,000	Weston-super-Mare	350,000
Dunedin, N.Z. (2nd)	275,000	Nottingham	1,000,000	Weston (2nd)	350,000
Durham	200,000	Nottingham (2nd)	1,000,000	Wexford, Ireland	100,000
Düsseldorf, Germany	1,000,000	Nuneaton	125,000	Wiesbaden, Germany	850,000
Eastbourne	1,250,000	Oberhausen, Germany	175,000	Winchester	225,000
Edinburgh	2,000,000	Oldenburg, Germany	200,000	Winchester (2nd)	125,000
Epsom	225,000	Ostend, Belgium	100,000	Wolverhampton	1,500,000
Epsom (2nd)	300,000	Ostend (2nd)	200,000	Zwolle, Holland	200,000
Falmouth	150,000	Perth, W.A.	125,000	Zwolle (2nd)	200,000

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CONTENTS.

EDITORIAL NOTES.

GAS, &c.—
Trade and Legislation 557
A Comprehensive Address 558
Petitions against the Standard Burner Bill 559
The Value of Gas Stocks 559
Conviction and Recommendation . . . 560
Relief from Naphthalene Troubles at Tynemouth—Cause of Improvement in Lighting Efficiency—The Piping of Houses—Cheapest Gas in London—"Gas Companies' Misfortunes"—Uncollodionized Mantles—Negotiations Suspended . . 560

Gas Stock and Share Market 562
Electricity Supply Memoranda. 562
Natural Gas Again 563
Experimental High-Pressure Gas-Lamps in the City of London 564
Pressure-Raising Plant at Tynemouth. By William Hardie 564
The Detroit City Gas Undertaking. By Jacques Abady 567
Water Legislation for 1910 570
Another Gas-Works under the Waters of the Seine 571
The Causes and Ranges of Variation in Calorimetric Tests. By Thomas Holgate, F.C.S. 573
The Gas Lighting of To-Day 576
Naphthalene Troubles Removed in the Tynemouth District 576
Manchester District Institution of Gas Engineers—Annual Meeting in Manchester—General Business 577
Inaugural Address of Mr. H. Kendrick . 577
Vertical Retorts at St. Helens 586
Illumination 587
Society of British Gas Industries—Presidential Address of Mr. J. H. Balfour Browne, K.C. 587
The Retorting of Coal. By H. O'Connor. 590
London and Southern Junior Association—Mr. Somerville on the Non-Collodionized Incandescent Mantle 593

REGISTER OF PATENTS.

Incandescent Gas-Lamp—Hands, G., and Breeden, F. 595
Burners and Mantles for Incandescent Gas Lighting—Chatterton, J., and Coventry, W. 595
Stills for Ammoniacal Liquors—Andrews, W. 596
Gas-Regulator for Bunsen Burners—Rose, A., Bellamy, W., and Yates, H. J. 596
Supporting Oxide in Gas-Purifiers—Wright, J. C. 596
Purifying Gas—Hall, E. L. 596
Valvular Devices for Incandescent Burners—New Kramerlicht G.m.b.H. 597
Valves for Closing Ascension Pipes—Beimann, W. 597
Applications for Letters Patent. 597

CORRESPONDENCE.

Gas Companies as Suppliers of Electrical Energy 598
The Largest Gas-Supply District 598

PARLIAMENTARY INTELLIGENCE.

Allocation of, and Petitions against, Private Bills 598
Progress of Bills 598

LEGAL INTELLIGENCE.

Water Supply for Railway Stations . . . 598
Ticehurst and District Water and Gas Company—Winding-Up of the Kitson Empire Lighting Company—The Ownership of Money in Gas-Meters 599

MISCELLANEOUS NEWS.

Illuminating Power and Testing at Sheffield 599
Commercial Gas Company 601
Reading Gas Company 602
Wandsworth and Putney Gas Company . . 603
Gas Companies and the Port of London Rates 604
Provincial Gas and Water Companies. . . 605
Gas Explosion at Manchester 607
Gas and Electric Lighting at Bishop's Stortford 607
Electric Lighting Loan for Marylebone . . 608
Liability for Defective Mains 608
Stand-By Water Supply for an Asylum . . 608
Notes from Scotland 608
Current Sales of Gas Products 609
Coal Trade Reports 610
Gas Stock and Share List 613

PARAGRAPHS.

Management of Gas-Engine Plants . . . 563
The Manchester and Disirict Junior Gas Association 566
High-Pressure *v.* Ordinary Gas Lighting for Mills 572
Midland Association of Gas Managers . . 575
Extension of Incandescent Gas Lighting in Battersea 599
Suicides by Gas at Bradford—Fall in Auer Gas-Light Shares 601
London County Council and the Standard Burner Bill 604
Reduction in Price at Tunbridge Wells . . 608
Cheaper Gas for Maldon—Competitive Installations of Gas and Electric Lighting—The New Gasholder Tank at Manchester—An Unjust Restriction at Manchester—A Cumberland Water Scheme 610
Falsifying Contractors' Time-Sheets—Barnet District Gas and Water Company—Gloucester and the Standard Burner Bill—Prospective Rise in Rates in Leeds—Paignton Water Supply—Penistone Gas Purchase Question 611

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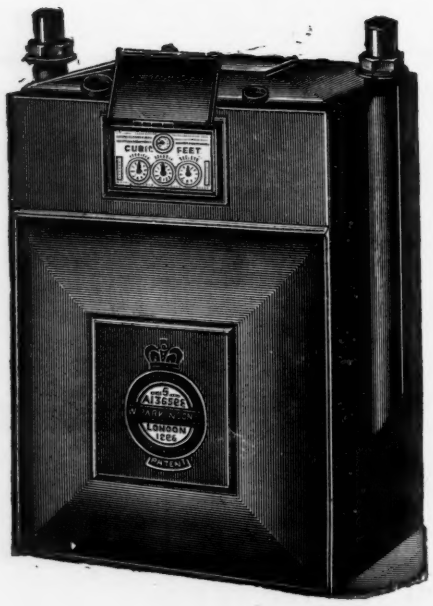

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EDITORIAL NOTES—GAS, &c.

Trade and Legislation.

THE Society of British Gas Industries have been fortunate in their Presidents; never more so than in the current year, for they have secured the services in that capacity of the eminent leader at the Parliamentary Bar, Mr. J. H. Balfour Browne, K.C. The Society are not in a position to add lustre to the honour that clusters around the name and work of their new President; but his tenancy of the presidential chair adds lustre and distinction to the Society. The members appreciate deeply the sacrifice that is made by one whose time is already so amply occupied in larger affairs, by his carving out of it a part to devote to the interests of this young organization. In the act, however, we trace the sensibility of a personal identity with an industry in the fortunes of which, legislatively, there has been a great and valued connection, and anything but regret that opportunity enables a tightening of the bond with at least one side of that industry. Moreover, there was the personal friendship, embracing many years, and created and cemented by frequent contact, between Mr. Balfour Browne and his predecessors in the chair of the Society—in order of succession, Mr. Dugald Clerk, Sir George Livesey, and Mr. Thomas Newbigging.

As an industrial and parliamentary lawyer, no one can speak more authoritatively, and with long and unique experience at the base, than Mr. Balfour Browne as to the conjunction existing between trade and legislation, and as to the wise and the defective legislation that is respectively constructive or destructive of trade interests. His professional life has been spent in fighting for the requirements of industry, in its defence, and in lightening the evil effects of mistaken and repugnant enactment. It was therefore peculiarly apposite that he should have taken as the subject for his Inaugural Address "Trade and Legislation." But it is, on the other hand, singular that a careful perusal of the address does not disclose anything that may be in Mr. Balfour Browne's mind favourable to our present legislative machinery in its relations to industry. It does, however, show (and pointedly) that he knows and appreciates to the full the defects that combine to produce enactment ineffective for good to the trade and industry of the country. But high though the standing of a man at the Parliamentary Bar is, he is not in any way responsible for this. He is not allowed to interfere with the machinery. He is not permitted to have the last word regarding the quality of the product. He can only use his gifts in counselling as to its character; and there perforce he must leave it. But reform is in the air; and this fact supplied the text for the address. Most people have long agreed that the House of Lords requires reforming; but few agree with the idea that it shall be either completely abolished or rendered so absolutely impotent that non-existence would be as good as continued existence. A Second Chamber there must be. Quite apart from imperial and national affairs, the value of the Second Chamber has frequently been found in connection with gas legislation. Mr. Balfour Browne would have the Second Chamber reconstructed; and its representative elements should include trade and industry—there by absolute right, and not by favour, or through (as now) the mere rewarding or honouring of an individual who has, through industrial and commercial pursuits of any kind, raised himself high in the estimation of his fellows and his country generally. Such a reformed Second Chamber as that mirrored in the address would meet with general approbation, excepting, of course, from the ranks of the extremists. The functions of the Second Chamber as it now exists are of a protective order that must, whatever else happens, be in chief maintained, though possibly improved. Mr. Asquith himself in 1894 well set out the nature of these functions; and they are incorporated in the address under review. The described functions are as applicable to a reformed Second Chamber as to the present House of Lords. One of these functions is found in this: "It must be keen to watch, and careful to "follow, the steady set, as distinguished from the transient "trend, of national sentiment; and it must always be ready "to defer to the manifestation of the popular will." By paraphrasing part of this, it is easy to make clear where our legislative machinery has so often failed in relation to industry, by producing repressive rather than helpful enactment. The Legislature "must be keen to watch, and "careful to follow, the steady set of industrial changes in "condition and requirement."

It is because the Legislature has not the assistance of technical competents to watch and follow the steady set of industrial change and requirements, that they have been unappreciative, and so have committed much legislative blunder. It is because of the want of technical capacity and incompetence in our Legislature in the various branches of industry and trade, that it has been unable to adapt itself readily to contemporary needs, and has hung as a clog far in the rear of the progressive strides that industry essays to make. We have found this very much of late years in the gas industry. The uses of gas have changed; and the character of the gas meet for the new circumstances is quite different from that required aforetimes when its bulk was required only for lighting. The industry knows the gas that is essential to the day and its purposes. But public sentiment is largely against change, merely because the public does not understand. Whose voice carries most weight in such a case—that of a public that does not understand, or that of an industry that does do so? Select Committees are good enough in their way in a judicial sense upon matters of ordinary character. But they are rarely capable of appreciating a technical necessity; and they find safety in keeping to the time-deepened grooves, in which largely survives the "popular will." Reform of the House of Lords is not the only improvement in legislative machinery that is required in the name of industry. Reform of Select Committee procedure is another, by introducing technical advisers, who have specialized in particular industries, and have their fingers on the pulses of those industries. It is admitted that, in the case of release from high standards of illuminating power, the gas industry has to a point—and to a point only—been successful. But the partial release did not come about until persistent agitation issued in technical inquiry; and Select Committees are now glad enough to have the backing in their decisions of the recommendations that Lord Rayleigh's Committee made. This shows plainly that they would not be hostile to technical guidance from an independent and conscientious adviser. Because of the absence of that advice, the tendency frequently is now, in matters of innovation and change, to accept the popular view as more or less faultily represented by the local authority, and to let matters remain as they are rather than make concessions helpful to industrial progress.

In another way, legislation is repulsive, and not helpful, to industrial progress. Legislation should offer inducement to industry to bring itself under its protection and control. But in the case of small non-statutory gas undertakings, it invites them to come under protection and control, but makes the coming as unattractive as possible. No one can compel a non-statutory gas company to go to Parliament unless it be a local authority who makes itself so obnoxious that life for the company becomes a burden; and then the only way to obtain any measure of protection from designed persecution is to apply for parliamentary authority. With what result, apart from the heaviness of fees? The applicants have no assurance of security on any matter; and they have no idea as to whether their applications will put upon them a limit to further existence. No non-statutory company cares for voluntary immolation, or to be made the victim of the petty jealousies and ambitions of the local

authorities. But that is what it comes to, and so there we have another direction in which reform is required. What chance, however, is there of such reform when current politics and legislation are so largely branded "Communism," and through which politics and legislation there is the open declaration of enmity to all private enterprise and individualism? Then, further, there is the difficulty that industry has of getting antiquated and other legislation that is obnoxious to its progress abrogated. The scope of necessary reform has, indeed, been considerably broadened and widened compared with what it was only a few years ago. Would that the final words of Mr. Balfour Browne's address were deeply planted, and would germinate, and bear fruit among our legislators. They are: "It is, after all, upon wise "politics that our trade depends; and it is due to unwise "legislation that this great business of industry and com- "merce has not made the progress in the past which the "ability of our manufacturers and the industry of our "workers entitled us to."

A Comprehensive Address.

Who will say, after the presidential address delivered by Mr. H. Kendrick, of Stretford, at the meeting of the Manchester District Institution of Gas Engineers last Saturday, that there is any dearth of material in the gas industry's affairs from which such deliverances may be constructed? Those who complain of any paucity of matter have in this address the negation direct. Never in the extensive history of the gas industry has there been a period when so many questions of first technical and commercial importance have claimed consideration, and consideration of the most critical kind. Development can only come from work; and, on every hand, there has of late years been in the gas industry development in the technical and commercial lines, opening up to those holding the dual capacities of engineer and manager, or only the one or the other, a broad field of view, and numerous matters for examination in detail. Development as well as progress emanates from such work. The point of actual achievement, great as the achievement has been, is only the starting-point for some fresh effort; and the vista before the gas industry fortunately reveals and promises very much more work, which should yield great intrinsic value. Therefore no one in the gas industry associates any part of his work with finality. All men, however, cannot engage—some have not the opportunity, some have not the capacity—in the prosecution of original work that has for its immediate object a common advance; but there are really few who cannot, having the inclination, engage in work that puts to proof new ideas and fresh invention, and extract from the investigation much instruction and interest. It is in this latter light that Mr. Kendrick's address is regarded. It is a record of painstaking work, submitting to proof, under his own conditions, new propositions with the set purpose of ascertaining what, if any, advantage would, by application, accrue to the interests for which he is responsible. Long as the address is, there is not a single part that we would have omitted. There is value in the results of the investigations not only to the Stretford Gas Company, but to the President's colleagues; and, in those parts where there is only personal opinion expressed, and not hard facts the resultants of research, that opinion invites more than superficial consideration from the very fact that the remainder of the composition shows the writer himself to be something more than a superficial observer.

Carbonization questions have a front place in the address; and the President is perfectly frank in declaring his views in connection with vertical retorts. He is not prepared to accept any one of the systems without further information. He has much respect, no one more so, for the work that has been done; but he asserts that the systems have not been tried in sufficiently small units in the medium size and small gas-works, and hints that there has been rather a significant economy observable in the intelligence as to capital, wear and tear, and renewals. We have been under the impression that Oberspree, Dessau, Bournemouth, Nine Elms, and St. Helens had yielded a fairly large amount of information as to the working of vertical retorts in small units; but perhaps our interpretation of the expression "small units" does not coincide with Mr. Kendrick's meaning. It is quite true that, in respect of capital cost, there has been reticence on the part of those interested financially in the systems; and it can hardly be expected, while any manner of proprietary right exists, that they will publish such figures broadcast, though at the same time it is not likely that confidentially submitted prices will for long be successfully maintained in secret. Concerning wear and tear, Herr Körting has given information in our columns (for example, on Nov. 9 last) that indicates his view that there is nothing to complain about in this regard—that, as a matter of fact, the conditions are so much more regular through ease of control and inspection in a Dessau vertical retort-setting, that wear and tear and renewals are items that should be found to be tangibly modified in contrast with horizontal and inclined retorts. With the Woodall-Duckham retort-settings, there has been little opportunity, by long continuous runs under ordinary working conditions, for ascertaining, save approximately, how these items will stand; and the same has to be said respecting the Glover-West plant at St. Helens. But on the experience, one can fairly presurmise; and there appears to be no reason for apprehension as to the items showing any alarming increase—if any increase—over older types of settings, particularly when, with horizontal retort-beds, the wear and tear of power charging and discharging machinery has to be incorporated in the account.

Owing to the limitation of his conditions, Mr. Kendrick has not been able to put to proof for any considerable period, carbonization of heavier charges and for longer duration periods; but so far as he has experimented, he seems very much to doubt whether, under the circumstances of the Stretford plant, taking capital, fuel, renewals, labour, and enrichment into calculation, there is for him much in the new method—the saving being small and the calorific value of the gas produced somewhat lower, but only to the extent of some 8 per cent. The smallness of Mr. Kendrick's financial advantage is apparently altogether due to his peculiar conditions; and he himself is not satisfied yet that he has realized all that may be gained, as is patent by the fact that he is going to revive the experiments in the coming spring with improved apparatus since installed. That Mr. Kendrick's experience cannot be taken as being any guide excepting to himself and others whose conditions may be of corresponding order, is proved by the remarkably fine showings in the manufacturing returns—productive and financial—that have been coming before us from all quarters during the past few weeks. They are of a character that cannot be treated as immaterial in the workings of any gas undertaking. But the President proceeds to show in his address that the heavier and the longer duration charge does not stand alone as the means of improving the working results of ordinary retort-benches. And here, for the first time, we have published independent of Stockport working experiences in the use of Mr. Meunier's arrangement for preventing undue oscillations of the liquor in hydraulic mains, and maintaining more equable conditions therein than formerly. The figures tabled by the President of his working at Stretford, show that, by the application of the arrangement, there is an improved make of gas, no loss in illuminating power, no loss in heating value, and a diminution of naphthalene stoppages. This is on six-hour working, and presumably the $6\frac{7}{8}$ cwt. charges. But as the whole of Mr. Kendrick's hydraulics were not, during the period embraced by the figures, fitted with Mr. Meunier's invention, it may be taken that, when there is conversion of the remainder, the results will be even better than those presented in the table. It is almost a pity, too, that while these records were being made, retort-house governors should have been introduced, though there was at least a prior couple of months' working with the Meunier arrangement in use, and the results, subsequent to the intervention of the governors, do not appear to have been appreciably affected for the better. To the employment of the new arrangement, Mr. Kendrick also ascribes the saving he is now effecting in the use of naphthalene solvent—the quantity being less than one-third of that required during December, 1908. The reduction and prevention of naphthalene constitutes one of the claims made by Mr. Meunier for his invention; and so there will be interest in this independent certification of value in this respect. Though the invention has been only partially applied, the testimony as to its particular and general utility is gratifying.

The subject-matter of the address is so extensive that comment upon the whole of it is out of the question. In passing, it is noticed that there is recommendation as to both the "Coalexld" and "Charco" processes being worth trying by gas undertakings desiring to produce coke of improved value for domestic purposes. Regarding "Charco," it would be of advantage to ascertain experience where its produc-

tion—under the system of dry quenching by the aid of breeze—has been tried. One trial of which we wot, carried out strictly on the lines laid down, resulted in combustion continuing for a time after the incandescent coke had been buried beneath the prescribed depth of breeze; and, after relieving the coke of the breeze, it was found that the "Charco" was of less weight than a like quantity of coke would have been if treated in the ordinary manner. At the bottom of the sections of the address dealing with enrichment costs, the value of pyrometers in connection with the fixing chambers of carburetted water-gas plants, and coal testing, is pointed out. If any manager wants awakening to a sense of the importance of making a survey, and rendering consumers assistance in connection with their gas-fires, he may obtain what is necessary from the results of active work at Stretford. The gas-fire is going to play a large part in the future business development of the gas industry; and inefficient and defective gas-fires ought not to be allowed by the responsible administrators and officials of gas undertakings to obtrude themselves on, and so hinder progress along, a path that is destined to lead to greater things for the industry in the future than in the past. So we pass on in the address from interesting subject to interesting subject until we come to the warning regarding the subterranean work of the General Post Office in relation to telegraphs and telephones. The Government Department under their Acts appear to have plenary and arbitrary powers so far as other occupants of the subsoil are concerned, while these have only a modicum of protection accorded them. So far as Warrington is concerned, as we showed in reviewing the Bills for the coming session, the Corporation are proposing to trim the Postmaster-General's powers in connection with gas-pipes, mains, and other apparatus. There is certainly ground here for some useful action and representation on the part of the Institution of Gas Engineers and the Gas Companies' Protection Association.

Petitions against the Standard Burner Bill.

THE Gas Companies uniting in the promotion of the Standard Burner Bills have now, through the petitions presented, full knowledge of the amount of opposition, and the nature of the allegations and requirements that they will have to meet. In the first place, readers may be reminded that there are 47 Companies concerned in the promotion of the Bills, and that these refer to 49 undertakings. Of the 47 Companies, there are only 33 that are opposed; so that there are 14 companies who have local authorities in their area who are not in sympathy with the organized movement against the Bills, and who appreciate the unwisdom of entering into a contest over a matter that has been so thoroughly endorsed in succeeding sessions by Parliament and by the Board of Trade. The number of petitions lodged is 42, which is an average upon the Companies opposed of less than 1·3. This again is significant. Looking down the list of Companies, it is recognized that there are few of them that have not each to deal in their supply districts with a plurality of local authorities, so that there is not unanimity of opinion on this particular subject among the latter in the areas in which the Companies are opposed. This is the more surprising having regard to the way in which the opposition has been worked up, and the easy terms on which the local authorities have been given an opportunity of making an attempt to "squeeze" the Companies in which they happen to be interested.

There is great similarity in the allegations and requirements in the petitions presented. Parliament cannot fail to note this, and will regard the fact, together with the number of petitions presented, as an effect of the organization of opposition. Had there been no organization, it is fair to assume the opposition would have been considerably less than it is. In favour of the promoters, too, there will also be noted by Parliament the want of unanimity among the local authorities in districts served by the Companies. Many of the allegations and requirements in the petitions are absolutely frivolous; and most of them are foreign to the simple and single object of the Bills, which object has a long line of parliamentary endorsement in its favour. The allegations are not new, nor are the requirements; and they have been ruled out by Parliament when preferred or submitted on previous occasions. History and experience are against the petitioners. When it is contended that the provisions of the Bill are special to the London Gas Companies, there is the whole history of gas-testing to show that the generally applied statutory methods of testing have always had their inception and first application in London, and that the particular proposition of the present Bills has been applied to gas undertakings—company and local authority—in all quarters of the country. Experience of consumers' gas accounts in large areas of London and elsewhere prior to and since the adoption of the "Metropolitan" No. 2 burner is the practical proof of the puerility of the petitioners' submission that the Bill will enable the promoting Companies to supply gas of lower illuminating and heating values, to the financial injury of the consumers; and, moreover, as most of the Companies are working under the sliding-scale, any financial advantage (if any) that may be derived from the use of the burner will go, with the exception of an almost negligible fraction, to the consumers. When it is suggested that the new burner is either "unsuitable" or by no means "practicable for use by the consumer," in accordance with the terms of the Act of 1868, it rests with the petitioners to show that any testing-burner giving a luminous flame is, in these days of incandescent gas lighting, "practicable for "use" by consumers other than prodigals and fools.

Some of the petitioners are submitting that a calorific test should be applied. This is a matter that has been fully dealt with in recent articles in the "JOURNAL" on "The "Case for the Standard Burner Bill"—a series of articles which, we are pleased to know, has received widespread approval in the gas industry—and we should be merely repeating the arguments adduced in those articles did we criticize here the suggestion of the petitioners that there should be a dual test applied to the gas of the promoters. The petitioners have to choose between modern illuminating power testing conditions or the calorific power test, and the latter only after a period of local information testing in order to arrive at a just standard. Most of the other submissions by the petitioners have been treated upon in the series of articles referred to; and there are a few others with such a limited backing from petitioners that they will certainly be completely ignored by any Parliamentary Committee. It is also observable that the more important of the petitioners—excepting the London County Council, whose interest in the matter is of a rather modest character—are suppliers of electricity; and therefore in active competition with the promoters of the Bills. It is to the interest of these municipal competitors to make the conditions of gas supply as onerous as possible, because they of all people realize that—notwithstanding the allegations in the petitions as to the evil effects (drawn from imagination) of the use of the "Metropolitan" No. 2 burner upon the consumers—the gas companies, in face of well-sustained electrical competition, are not so idiotic as to adopt and apply any power that will inure to their own destruction.

Value of Gas Stocks.

A REPORT and financial statement that establish records in progress and prosperity are much to the liking of both a Board of Directors and the shareholders. With such a report and financial statement it was the happy lot of Mr. W. G. Bradshaw to have to deal when presiding over the meeting of the Commercial Gas Company last Thursday; and therefore, as may be supposed, there was most hearty congratulation, in which that excellent trinity in commercial partnership—Directors, ordinary proprietors, and official and employee co-partners—shared. We will not pass in review the causes that contributed to the good results of the half year. They have a strong resemblance to those that have been dealt with of late in treating of the same period's accounts and proceedings of other companies. A striking point in Mr. Bradshaw's address was his reference to the enhanced value of gas stocks and their continued stability, while other trustee securities have so considerably depreciated. Mr. Bradshaw explained—and no one is in a better position to judge of and explain—the reasons for the depreciation of the latter. Sufficient for this reference are the facts that there has been this depreciation, and that gas stocks have proved so perfectly stable during the period when market prices in other directions have been falling to pieces. "Public confidence," and "internal "prosperity" are the tags to be affixed to the statement as to gas stocks. As a trustee, Mr. Bradshaw has in possession some Commercial gas stock that was purchased about 1840 by his grandfather. In that stock there has been an enormous increase in value. Again, as trustee under his father's will, he holds stock purchased between 1865 and 1875. The bulk of the stock that he holds in his own right was bought about 1888, and that, too, has increased in

value. Looking back over the "JOURNAL" Money Market records, in our first number published on Feb. 10, 1849, it is seen that at that date the Commercial Company's £25 shares, paying 5½ per cent. dividend, were only selling at 25-26; and the £10 new shares, paying 5½ per cent., were merely realizing par to ½ premium. Some 53 years later—1902—the Act was passed providing for the conversion of the Company's stocks on 4 and 3½ per cent. bases. On Dec. 30 of that year, the market price of the old stock was standing at 250-260, and it was paying a dividend at the rate of 12½ per cent. per annum; while the new stock stood at 200-205, and was paying 9½ per cent. In the following year, the first quotations in our pages, after the conversion, put a market value on the 4 per cent. stock of 106-109, with a dividend of 5 per cent., while the market value of the 3½ per cent. stock was 101-104, with a dividend of 4¾ per cent. Last week the respective quotations were 109-111 and 105-107, with dividends of 5$\frac{2}{10}$ and 5 per cent. But in these days, when Chancellors of the Exchequer keep so sharp a look-out for fresh victims, it is well not to boast too loudly of these matters; for one never knows what may be labelled "unearned increment."

Conviction and Recommendation.

IF any justification were needed beyond already established facts for the caustic criticism of the Governor of the Gaslight and Coke Company (Mr. Corbet Woodall) of the conduct of certain local authorities owning electricity undertakings in the matter of the maladministration of the street lighting, it is to be found in the report of the Finance Committee of the London County Council on the application of the Marylebone Borough Council for a loan of £24,000 for extending the electricity cables and converting the public lamps from incandescent gas-burners to electric metallic filament lamps. The sum asked for has been reduced to £20,900—the difference between this and the sum applied for representing the additional cost of part of the work being carried out by the unemployed, instead of in the ordinary way. In other words, the Borough Council are, in contravention of all economic doctrine, going to pay more for the work being done by the unemployed, and obviously less efficiently than if executed in the customary manner. Inefficiency always costs more than efficiency. Better by far scatter the extra money among the unemployed, and have the work done at lower cost and properly. But what will not be understood by anyone interested in this question of the Marylebone loan is, by what irrational process the Finance Committee of the County Council came to their resolve to "reluctantly" recommend the granting of such a large unnecessary loan when all their convictions are opposed to the proposition being a sound one, and the expenditure an economic proceeding either from the point of view of the ratepayers or the electricity undertaking. The Committee are advised that the streets are sufficiently well lighted by the existing incandescent gas-lamps; and, as the Governor of the Gaslight and Coke Company showed recently (*ante*, p. 368), the Company are prepared to continue the lighting at a lower price than the Borough Council electricity undertaking, and give more efficient illumination.

Moreover, the Finance Committee regard the scheme as speculative, inasmuch as, apart from the receipts from street lighting, the revenue the electricity undertaking will derive from this large expenditure on cables is not likely to yield a substantial sum. It is from this purely unknown quantity—the adventitious private business—that the thousands of pounds of capital expenditure on this big extension of the cable system is to be vindicated; for the street lamp business cannot yield anything towards the means for discharging the capital obligation. The chance of vindication coming along in the shape of a large accession of private business from the new cables is very remote. The best part of the area—the "best" for electricity business—is already cabled; and the streets through which it is now proposed to run cables will, the prospects are, be of very minor productiveness. So think the Finance Committee of the London County Council; and they are also of opinion, and give their reasons for it, that, having regard to the present position of the Marylebone undertaking, the Borough Council should not incur this heavy capital outlay. But pious expressions of opinion of this kind and inferrible counsel do not go far towards putting a stop to municipal prodigality. Nothing short of an impregnable firmness is necessary; and with such a strong sense of the unwisdom of the scheme upon them, it is regrettable that the Finance Committee of the County Council should have so far violated the principles of the municipal reformers as to have, by their action, connived at a proposition that, however considered, must be regarded by any independent mind as financially vicious. The suggestion of Mr. Woodall that this new phase in the administration of local affairs—introduced by electricity trading and speculation, and repugnant to legitimate and economic local government—should be the subject of inquiry by a parliamentarily appointed Committee or Commission, is one that should receive not only the consideration but the active support of all intelligent men. Mere passive concurrence will not do. Though a business be run by a municipal body, it should not be run so as to be a charge on the rates; and in respect of any business offering by the various municipal services, it should be subject to competitive laws and not preferential favour. Until these conditions are legally assured, there will, it may be taken, be repetitions of this Marylebone scandal.

Relief from Naphthalene Troubles at Tynemouth.

The efforts of gas managers to relieve themselves of the troubles attendant upon the deposition of naphthalene in the mains and services are so often unattended by success, that it is pleasant to be able to record an instance to the contrary; and it will be found in another part of the "JOURNAL." For some years, Mr. William Hardie, the Engineer of the Tynemouth Gas Company, tried various expedients for getting rid of the nuisance; and at the annual meeting of the Company last week, the Chairman was able to communicate to the shareholders the gratifying information, contained in a letter received from Mr. Hardie, that naphthalene troubles no longer exist. Evidence of this was afforded by a recent inspection of the mains, both on the works and in the district. Much benefit was derived from mechanical treatment of the gas; but a great deal more from the use of a special oil prepared in the laboratory of the works, which has brought total relief at a very trifling cost. When it is mentioned that by means of this solvent the stoppages due to naphthalene have been brought down from about 4000 to 30 per annum, some of our readers will doubtless be desirous of testing its efficacy in their districts.

Cause of Improvement in Gas Lighting Efficiency.

In a popularly written article on the lighting engineer in the "Daily Telegraph" on Monday last week, the "Engineering Correspondent" of our contemporary falls into a common, but perhaps pardonable, error in asserting that "there is little doubt that the many improvements in lighting by coal gas owe their origin to the competition of electricity." Welsbach himself would be the last to admit that electricity had anything whatever to do with his rare-earth researches, and the discovery which culminated in the development of the incandescent mantle. The tale of Welsbach's revolutionizing discovery in 1883 in the laboratory of Bunsen at Heidelberg is almost romantic, and is well known to all students of gas affairs. The improvements that have been made in gas lighting have followed as a natural consequence from the new line of investigation and invention that the mantle opened up. It brought into being and has developed quite new fields of industry; and, apart from external scientific investigation, the occupants of that field have, in the struggle for supremacy, bestirred themselves, and brought about a large measure of improvement. This, however, may be admitted, that electrical competition has been a stimulus to improvement in the commercial methods of the gas industry; and so well in many districts has the gas industry looked after the organization of this particular department, that what has been done is at once the admiration and the envy of their competitors.

The Piping of Houses.

The same writer makes a charge of lack of application of scientific rule in the gas-piping of houses. He says that it is probable gas-fitters generally do their work with little consideration for engineering rules. The important question of length of pipes, and the resulting friction of gas, he asserts, is frequently neglected by those installing gas, with the result that a considerable falling off of the illuminating power of lights is noticeable when a few extra ones are turned on in other parts of

the building. He calls to mind an instance where this is always observed to happen in an otherwise well-appointed house. After all, such instances—they are not general—are usually found in old houses, and not in modern piped ones, unless they be of the jerry-built class, where the builder practises a blind economy which goes to make his houses unattractive. But when one thinks of the hundreds of thousands of existing houses that were piped before cooking-stoves and gas-fires were so largely installed and supplied by means of branches from old fittings, the marvel is that the percentage of complaints of deficient supply is not larger than it is. In a measure, that the percentage is not larger must be ascribed to the consumption economy of incandescent gas-burners, which make, light for light, an infinitesimal draft on the pipes contrasted with their flat-flame predecessors. But nowadays gas undertakings exercise a greater supervision over internal fittings than they did in times past, when there was a rigorous cessation of all responsibility at the meter. The writer also complains that rules for the correct size of pipe vary considerably—indeed, in the case of two formulæ given in the same work, the quantity of gas flowing is given in one as proportional to the square root of the diameter, and in the other as proportional to the square root of the fifth power of the diameter. Both cannot be correct, though the fact that the diameter is in inches, and generally in the neighbourhood of 1, causes the formulæ to give fairly consistent values for small sizes, such as are used in houses. However, if the engineering critic of our morning contemporary will read Mr. Chandler's article in the "JOURNAL" for Feb. 8, and Mr. F. S. Cripps's article in last week's issue, he will see that this particular aspect of his subject has been receiving the attention of competent investigators.

The Cheapest Gas in London.

It was with pardonable pride that the Chairman of the Wandsworth and Putney Gas Company (Mr. H. E. Jones) referred, at the meeting of the proprietors the other day, to the fact that the Company had now reached, for ordinary purposes, the lowest price—1s. 10d.—charged for gas in London or the suburbs. In fact, one has to go a good journey from London to find the equal in lowness to the Wandsworth price. The 1s. 10d. is not the Company's minimum. One-twentieth part of the gas sent out by them is used for power and trade purposes; and on this a discount of 15 per cent. is allowed, which brings the price down to 1s. 6·7d. per 1000 cubic feet. Apart from the gas used for ordinary trade purposes, the Company have within their territory large gas-mantle factories; and these take a considerable quantity of gas, and no doubt glad enough are the managements to get their requirements met at so moderate a figure. Mr. Jones bestowed honour where honour is due for the notable low charges of to-day. It was those who laid the foundations of the gas supply in the district who made possible the existing proud position of the present administrators and officers of the Company in supplying gas at such low rates. Names mentioned in the Chairman's speech of men who took part in the direction and work of the Company in times past, and to whom all associated with the Company in these times are indebted, were those of Dr. T. S. Howell, Mr. Robert Jones (father of the present Chairman), and Mr. Harry Freeman, erstwhile the Engineer, now a Director of the Company. Dr. Howell and Mr. Robert Jones rest from their labours; their works live. Prudent and economical administration and control of the capital account in their time has worked wonders. Their policy in this respect and in active enterprise is the policy of Directors and officers to-day. Gratification with the positions they hold in connection with a Company that has made this record, and in the making of which record they have taken part, is naturally indulged in by the Engineer (Mr. H. O. Carr) and the Secretary (Mr. Chas. W. Braine).

"Gas Companies' Misfortunes."

It is not often the "Financial News" makes such a slip in alluding to gas stocks as it did the other day by inferentially roping in the whole number of British gas companies with the wretched little concerns that have come to grief through the exploits on the fringe of the industry of a number of queer company promoters. Our financial contemporary quoted the East Sussex, Ticehurst, Rawcliffe, and Robertsbridge Gas Companies which have proved disastrous "investments" for the shareholders, and then added: "It is not often that so persistent a 'run' of ill-luck attends one class of enterprise. Doubtless these misfortunes explain the reluctance of investors to subscribe for gas shares at the present time. They can hardly be blamed for their hesitancy." This ill-considered statement was quickly fastened on by correspondents, who pointed out to our contemporary what is a well-known fact, that all gas companies, large or small, that are well established, and have good reputation, find no difficulty whatever in the placing of new issues—many of substantial amount. The gas industry was never in sounder position than at the present time, nor were its prospects ever brighter, having in view the large expansion of the uses of gas. The current prices of gas stocks, and the amount of capital raised in the last few years, offer an abundant refutation of any hesitancy on the part of investors to place as hitherto their confidence in gas stocks. But numerous investors have been taught by experience to discriminate between good and bad. It is, unfortunately, the investors who have been hitherto misled, and fortunately the promoters of these risky (we were nearly writing fraudulent) concerns, who are feeling the run of ill-luck—and not the "one class of enterprise" as represented by the gas industry generally.

The Uncollodionized Mantle.

Attention may be briefly drawn here to the paper which was read by Mr. Percy G. Somerville before the London and Southern District Junior Gas Association last week. The author is a member of the staff of the Chief Inspector's Department of the Gaslight and Coke Company; and he was able to give his hearers some highly interesting information with regard to the adoption by the Company of the system of using non-collodionized mantles. He explained that the method was introduced into this country about six years ago by Mr. Corbet Woodall. The limp mantles are purchased; and they are then modelled, burnt-off, and seasoned by the Company's employees. When these operations are completed, the mantles are placed in glass cylinders, and taken to the street-lamps or consumers' premises It is found that not more than 2 per cent. of the mantles so carried are broken in transit; while there is a saving of about 3s. per gross by using the uncollodionized type instead of the usual collodionized form. This is well worth considering, on the half million or so mantles the Company are now annually burning-off. There were many other points of interest in the paper which cannot be alluded to here; but a report of the proceedings will be found in another column.

Negotiations Suspended.

Last Saturday, the South Wales coalowners and the miners' representatives resumed negotiations at Cardiff for a revision of the coalfield agreement which expires at the end of March. But once more the conference proved ineffectual; and in view of the shortening of the time left in which to come to a settlement, each abortive meeting adds to the seriousness of the situation. On the latest occasion, the conference sat for about seven hours; but even at the end of this period neither side would submit modified proposals. It is stated that the discussion was chiefly upon the questions relating to a fixed rate of wages for work done in abnormal places, the fixing of an equivalent selling price of coal to the minimum wage-rate, and the demand of the workmen for payment for small coal. In holding out as they are doing on the wage-rate question, the men are supported by the Miners' Federation of Great Britain; but on all other points, it seems, they are given a free hand. A suggestion by the owners that certain points should be submitted to arbitration was declined by the men's representatives. After the break-up of the conference, an executive meeting of the Miners' Federation was held, when Mr. Tom Richards, M.P., was instructed to communicate with the General Secretary of the Miners' Federation of Great Britain, asking that a national conference be immediately called to consider the whole of the matters in dispute in South Wales. The best that can be said of the present position of the coalfields dispute is that there is still opportunity for a settlement to be arrived at, if both sides are anxious to do so.

At the meeting of the Metropolitan Water Board last Friday, on the recommendation of the General Purposes Committee, the salary of Dr. A. C. Houston, the director of water examination, was increased from £1000 to £1100 a year—the advance to take effect as from April 1 next.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 613.)

BUSINESS in the Stock Exchange last week might almost be summed up in two words—Rubber and Oil. Here speculation was rampant (especially in the former line), serenely indifferent to the political tempest which dominated the chief markets. In these, business was at very low pressure; the prevailing disposition being to await developments. The opening day was quite quiet; business being arrested by various factors, from political puzzles to broken telegraphs. Most lines were rather weaker if they moved at all; but Consols had a small rise. Tuesday was inactive, and things were dull. Railways lost ground, but recovered partially. The Foreign Market was uneasy about the Near East. Wednesday was more active with a better tone, mainly by the cheapness of money. Consols, however, were an exception to the upward tendency. Things became dull and heavy again on Thursday. Consols receded ¼; Railways were idle and uncertain; and even in the speculative markets there was a check. Friday was almost equally quiet, but not weak. The gilt-edged division was mostly firm; and the other leading departments were very fair. Saturday was much the same; but Consols rose ¼ for the account. Movements elsewhere were rather irregular. In the Money Market, there was a good demand for the Stock Exchange settlement, and discount rates hardened; but at the close there was a tendency to greater ease. Business in the Gas Market was a good deal quieter than the previous week for all classes of undertakings; and there was hardly any change in quotations, except for variations *ex div.* Of these, there were a large number—as usual in the final February account. In Gaslight and Coke issues, the ordinary was only moderately active, but firm and steady. With the exception of one special bargain done at 104⅜, all transactions ranged from 104¾ to 105¼. The secured issues were only lightly touched; the maximum marking 88½ and 89, the preference 104¼ and 105, and the debenture 81½ to 82¼. South Metropolitan was not active, but was stronger, changing hands at from 120 to 121½—a rise of 1. The debenture realized 82½ and 82⅞. Commercials were hardly noticed; one deal in the 4 per cent. at 110¼ *cum div.*, and one in the debenture at 81, being all that was done. Among the Suburban and Provincial group, business was at its lowest ebb. One transaction in Alliance and Dublin at 86½, and one in South Suburban at 123½ *cum div.*, being the total. The Continental companies were almost correspondingly inactive. Imperial was done a few times at from 175 to 176½, ditto debenture at 92 and 92½, and Tuscan at 9½. Among the undertakings of the remoter world, Bombay fully-paid changed hands at from 6 to 6⅜, and ditto part-paid at 4 11/16 and 4 13/16. The Argentine Companies were still pretty busy, though Buenos Ayres was not dealt in. Primitiva marked from 7⅝ to 7 13/16, ditto preference from 5 7/16 to 5 9/16, ditto debenture 99 to 99¾, River Plate 17 13/16 to 18 (a rise of ¼), ditto debenture 99¼ and 100½, and San Paulo 14⅞.

ELECTRICITY SUPPLY MEMORANDA.

Intrinsic Brilliancy of Metallic Filaments—Shaded or Concealed Lamps Necessary—Metallic Filament Prices—Controversy Among the Juniors—Contractors and Municipal Trading.

ELECTRIC light and eye strain has been the subject of correspondence in the "Pall Mall Gazette." The public are finding out by experience that the metallic filament lamp is the cause of discomfort and even injury to the eyes; and that the only remedy is to properly screen the lamps, or to hide them away and use the reflected light. The incandescent gas mantle has an intrinsic brilliance by no means low; and it ought to be kept at such an angle and distance as to prevent any direct influence upon the eyes. But the intrinsic brilliance of the fine filaments of the metallic electric lamp is so immense that the most thoughtful electricians are convinced that it will be to the interest of the electrical industry to advocate, and set the example of having, the incandescent filaments completely obscured. What the public are finding out, recognized leaders of the electrical industry are now admitting, both by their teachings and actions. If the Illuminating Engineering Society has yet served no other good purpose, its existence has been useful by giving a platform (in the discussion on "Glare" published last week) to Mr. A. P. Trotter, Mr. W. M. Mordey, Mr. J. H. A. Baugh, Mr. Cooper, and others—electricians to the backbone—for stating their opinions and experiences in regard to the detrimental effect of metallic filament lamps. Mr. Trotter, who is Electrical Adviser to the Board of Trade, pointed to the necessity for screening such lamps. Mr. Mordey (who is the ex-President of the Institution of Electrical Engineers) referred to the "terrible whip-lash" of the lamps on the eyes. Mr. Baugh confessed that to him the metallic filament lamp was "positively painful," while Mr. Cooper agreed that at night time it was a "distinctly unpleasant thing to look at." There is no question among these electrical experts on this point; and it will be to the interest of the public eyesight that the public be made acquainted with the views, expressed with such perfect candour by these electricians.

The evil being admitted, the cure is the next matter for consideration, and there was a consensus of opinion, among those who took part in the discussion, that to use the lights without proper shades or ensconcing them in some other way—say, in the cornice—is a huge mistake. The conviction on this point is so strong that, for the new lecture-theatre of the Institution of Electrical Engineers, the Council have decided, cost what it may, to avoid the "terrible whip-lash" of the metallic filament lamps upon the eyes of the electricians who will assemble there, and to utilize the light of the lamps by reflection. Mr. Trotter, Mr. Baugh, and others referred to the prohibitive expensiveness for ordinary purposes of the ceiling-reflected light of concealed lamps; but it is this costly system of illumination, and only this system, that the Institution of Electrical Engineers think good enough and proper for their new theatre. It may illustrate an ideal system of illuminating the interior of such a building; but it will also illustrate a method of illumination which the pockets of few consumers will allow them to adopt. It is, however, significant that the Electrical Engineers felt it incumbent upon them to cast their decision in favour of such an expensive system of illumination; and, by so doing, they have emphasized the injury-dealing effects of the new lamps. If ordinary consumers cannot go in for this costly method of illumination, then the next best thing for them, for the protection of their visual organs, is to use obscured globes. Obscuration means loss of light; and the loss of light has to be made up by the adoption of a greater number of sources of illumination. This represents increased expense; and therefore the comparative statements of central station engineers and sales managers as to the cost of inverted gas-lamps and electric metallic filament lamps must be revised in favour of the former—seeing that the useful efficiency of the latter will not be that obtainable from clear-glass lamps, but that realized through an obscured globe, or by reflection from the ceiling.

There has been quite a flutter in the electric lamp trade in this country over the reports from Germany as to the breaking down of the prices of metallic filament lamps there owing to competition—a matter that was referred to in the "Memoranda" last week. It is thought, however, that what is happening in Germany will not affect the wholesale and retail prices here. The Osram lamp is supposed to be in such a strong position in the matter of contracts, that the makers—the General Electric Company—will be able to maintain present prices for at least twelve months. We are not at all so sure of that, so far as current business, apart from contracts, is concerned. The feeling of the consumer (mistaken or otherwise) is that, whatever the quality of the Osram lamps, the prices are all too high; and there is no doubt there will be, with the lowering of German prices, a considerable influx of the cheaper and perhaps inferior types from that country. It is feared that, if this happens, and discontented users result, the difficulty of the contest with modern incandescent gas lighting will be much increased. For the Osram lamp to come down to the level of the German prices, would mean a reduction of at least 15 to 20 per cent.; and it is hinted that the makers of the Osram variety could not stand this, and still give lamps of quality equal to those at present on the market. The Allgemeine Elektrizitats-Gesellschaft are the prime movers in producing the break of prices in Germany; and their action is regarded as a direct blow at the Deutsche Gasglühlicht Gesellschaft, the makers of the Osram lamps in Germany, whose activity in the gas mantle and metallic filament lamp businesses was the subject of remark last week. There appears to be, as a result of the existing position in Germany, a desire on the part of some of the makers to form a sort of combine, with the view of acting in concert in the matter of regulating prices; but without the largest makers, such a working body would be absolutely ineffectual.

There must be congratulation to both the Manchester District Junior Gas Association and the Manchester Electrical Engineering Students on the high level in tone and matter of the debate published in our columns last week, on the relative aspects—cost, efficiency, constancy, and so forth—of the applications of gas and electricity to cooking, heating, and power. There is a mass of information in the debate that the commercial men of the gas industry will with advantage be able to add to their present accumulations of points useful in the carrying on of their work. The junior gas engineers were exceedingly well prepared for the oral and mental fray; and the electrical students were better equipped on this occasion than they were when the two bodies previously met in friendly debate. But though we may not be so classified ourselves, we think any disinterested person reading our report of the discussion (which included both the gas and the electrical speeches) will say that, in weight of hard facts and sound reasoning, the junior champions of the gas industry gave a better account of themselves and the interests of their adopted industry than did their opponents. We must, however, say this for the electrical side, that 1s. per 1000 cubic feet of gas for heating and cooking was hardly a fair current price to take. Whether it will generally come to that in the future is not a matter upon which we need exercise ourselves just for the present. But, on the other hand, the 1d. per unit that was taken for electricity for the same purposes set at naught all the principles that were at one time piously advocated for observance in the arranging of tariffs by electricity purveyors. Though both prices were low, however, they made little difference to the argument, financial or otherwise, because in cost of cooking and heating appliances, running expense, maintenance costs, and efficiency, all along the line it was shown (as there was no difficulty in doing) that the excelling point of gas was so far in advance of electricity that a considerably higher

price for gas could have been taken, with economy still on its side. Practically all that the electrical students could submit was the piece of weakness and nonsense—the forced parrot-like reiteration of which lays claim to our sympathy—that electricity can compete with gas so far as utility, cleanliness, and healthiness are concerned. The attitude taken up by the electrical students was that the least said by them on the question of cost, the better; and they skipped with the agility of youth from all explanation as to the foundation for their belief regarding the superiority of electricity in the matter of usefulness, cleanliness, and healthiness. One speaker, in spite of the millions of people (and electricians among the number) who live daily on gas-cooked food, spoke of its being "tainted" by the gas. It is a great pity the students of the electrical industry should have been schooled so well in the failing of their seniors in respect of postulatory statement. They have, or they profess to have, the earnest faith of their predecessors in the assumed pre-eminent virtues of electricity—albeit the want of economy—ousting gas for cooking and heating. Let us hope the faith will be sufficient to sustain them in the hours of their disappointment. As with heating and cooking, the junior gas engineers got the better of their opponents over the power question on the points of cost, reliability, and efficiency. But there was no denying on the part of the junior gas engineers that there are situations where, and purposes for which, electric motors are more convenient than gas-engines; even so, the gas-engine is a cheap way of obtaining the electrical energy. There is no purpose to be served by denying what is obvious and what is proved. The 20 per cent. dividend paying gas-engine companies will smile hugely over the statement of one youthful aspirant to electrical fame, that "the only reason why gas-engines are sold is that there happen to be places at the present time where electricity is not procurable." Really a greater sense of responsibility should be inculcated in the electrical seminaries, for statements of this kind only provoke the mirth of those on the other side of the way.

The officers of municipal electrical fittings departments see future happiness in one direction in which there has been much unrest. The Electrical Contractors' Association have been, in the protection of the interests of their members, a veritable thorn in the sides of these sections of municipal enterprise; and the organization has met with a large measure of success in keeping municipalities within the sphere of legitimate operation, as defined by their parliamentary powers. There is, of course, much to be said on both sides; and to say it all would require more space than can be devoted to it here. It has, however, been thought that the Association objected, without any qualification whatever, to the trading in wiring and fittings. All who so believed have evidently been labouring under a mistake, as is seen in the official organ of the Association. There we now read: "To the electrical contractor, the maintenance of a fair selling price is everything in the world. What care we who engages in the sale of electrical goods, so long as the transaction is on a fair commercial basis? Surely we have no grievance here! In the past, our complaint against supply authority sales departments has been (once more, most emphatically) that prices have been cut—aye! shamefully cut. And upon this point, and this point alone, is based our objection to the rate-aided competition." Indeed, electrical contractors, it is understood, would not oppose the establishment of such trading departments in every town in the kingdom, did they feel sure that those responsible for their management would observe the condition as to prices being on a fair commercial basis. The expression put into the statement points to deliberate, and not hasty, consideration; and those in favour of municipal trading in electrical wiring and fittings have certainly not been slow to take the "Electrical Contractor" seriously.

Management of Gas-Engine Plants.

Gas-engine plants, particularly those operating with suction producer gas, have suffered so much in the past by improper management, that it is gratifying to learn from a recent report by Mr. R. H. Fernald, issued by the United States Geological Survey, that operators are generally more proficient now than they were formerly. We learn from "Engineering Record" that Mr. Fernald and an assistant have personally investigated the conditions at a number of such plants, and have arrived at the conclusion that difficulties with producer-gas engine installations are more often due to this single cause than to any other. The report referred to proves definitely, however, that well-built plants properly managed give excellent satisfaction, even with poor grades of fuel. Producer-gas power plants have advantages for certain uses that cannot be gainsaid; but their introduction will be more rapid if manufacturers will co-operate with engineers to a greater extent than they do now. Plants of this sort are still such a novelty that exceptional attention should be paid to them by manufacturers of their equipment, even after the installation is completed. It should not be forgotten that the best salesman is a satisfied purchaser; and the best way to make a satisfied purchaser is to help him to utilize in a successful way the equipment he has bought.

Mr. G. H. Raddin, of Lincoln, has been appointed Assistant Water-Works Engineer to the Bolton Corporation.

NATURAL GAS AGAIN.

GENERALLY speaking, it is a pleasure to come unexpectedly across an old acquaintance; but there are exceptions to this rule, as to others—and one of the exceptions has just occurred at the "JOURNAL" office. We have had brought to our notice a prospectus, dated Feb. 21, 1910, of the South of England Natural Gas and Petroleum Company, Limited. This date is the newest thing about the matter; the "undertaking" which it is sought to acquire is old enough to have achieved notoriety years ago. Indeed, the whole thing long since became a "great bore," though not in the sense in which the words are used in the fearful and wonderful example of the company promoter's art which now lies before us. The document is, it is true, marked "For Private Circulation;" but as we have been favoured with copies from at least half-a-dozen correspondents, it may fairly be assumed that the widest publicity is desired for the proposals—a desire which it would be a pity to discourage.

Natural gas, as has been announced on occasions too numerous to mention, was discovered some years since at Heathfield, in Sussex, when the London, Brighton, and South Coast Railway Company were boring for water, and since that time the station premises and a neighbouring hotel have been lighted by this means. Surely, if he was aware of this circumstance, the writer of the prospectus must have been struck by the humour of the thing when he was penning the following somewhat loosely constructed statement: "It is believed that a large supply of water will be found when sinking the borehole, and which the Directors believe can be disposed of to the local Water Company, if that Company consider the water suitable for drinking purposes. The Directors believe that this will also prove to be a good source of income." When water is sought, gas comes up; and when gas is to be sought, water may be found. It sounds almost like a conjuring trick. But the first part of the operation, at any rate, was true enough. Gas came when water was sought; and it is estimated that the Railway Company now use some 100,000 cubic feet per annum. "Not much to go upon here," the reader will say. No; but it seems to be the only tangible proof of the existence of that natural gas in Sussex, which is to make "a possible Pittsburg in the South of England." Companies have been formed on even more slender bases than the emanation from the bowels of the earth of a supply of gas that would perhaps be sufficient to meet the requirements of one or two medium-sized private residences; and sure enough a Company was started to exploit this grand discovery. Much talk followed, in the usual course of things; but the last we heard of the venture was that the effects were to be sold at auction. An inglorious end to the exploitation of natural gas, people thought at the time; but they were mistaken—not as the "ingloriousness," but as to its being the "end."

Here is the revival! A share capital of £20,000 (one-half in 8 per cent. preference shares), and debentures. "Applications for shares and debentures at par will be entertained by the Directors not later than Monday, the 28th February, after which date the balance (if any) unallotted will probably be advertised for public subscription at a premium." With this money—should anyone be found to supply it—steps are to be taken to sink the borehole to a much greater depth; and "in the event of the proposed boring providing a satisfactory quantity of natural gas or commercial petroleum shale, it is the intention of the Directors to propose the formation of a new Company with a larger capital for the purpose of taking over the works and furthering the objects of this Company, paying cash and allotting shares to shareholders in the present Company on the following lines: For each £1 share of the present capital issued, £1 10s. in cash, and a £1 fully-paid share." It is evident that, though years have elapsed since the natural gas first made its appearance, there is now great anxiety to proceed with the work; for intending applicants are invited to send on their deposits to the Natural Gas Office, Heathfield, which will avoid any possibility of delay on the part of the bankers if the money was sent through them. In fact, they are not only "invited," but would be compelled to do so; for though a banker's receipt accompanies the form of application, no statement is made on the front page of the prospectus as to who are the Company's bankers. There is, however, something useful in another direction to be found in the document—that is, an indication of the "stable" from which the promotion comes. One of the Directors is Captain F. Jenkins. Was he connected with the unfortunate East Sussex Gas Company? And among the subscribers to the Memorandum of Association is to be found Sir Charles B. H. Soame, Bart., whose name has a familiar ring about it.

The years which have passed since this "discovery of national importance" was made while boring for water, have borne fruit in one direction. They have given time for the evolution of a "Natural Gas Expert," who has joined the Board, and prepared calculations as to possible profits and so forth which are of a truly amazing character. The figure finally reached is a net revenue of £45,659 19s. 4d. We admire that "19s. 4d." It is so much more convincing than would be £45,660. It is also stated, presumably so that it may be a guide to the would-be investor, that the Scotch shale oil companies have made a profit of over £1,000,000 sterling up to the present time. As a further bait, it is stated in a footnote to the prospectus that: "The £1 shares of the Kent Coal Concessions, Limited (a Company which has found coal and shale in boring about 60 miles from the Sussex gas fields), are

quoted, the Directors are informed, at about £2 17s. 6d., or nearly 200 per cent. premium." May we suggest that, if further copies of the prospectus are printed, a second note should be added, to the effect that, after years of work and the expenditure of many thousands of pounds, the Kent Collieries Company—whose works were the first started to prove the existence of coal in payable quantities in Kent—has for a long time been in a moribund condition, with its shares practically unsaleable? And "Coal in Kent" has been as convincingly preached by geologists as can be "Natural Gas in Sussex."

In conclusion, one word of explanation of—or apology for, if such be thought necessary—the vein in which this has been written. We have declined to take the prospectus really seriously, for the simple reason that it seems to us impossible that any of the readers of the "JOURNAL" with money to invest should regard it as a desirable commercial proposition. The temptation is strong to deal further with its fantastic features; but already more space has been devoted to the subject than it deserves. The "Natural Gas Expert" strongly recommends the project; we do not—at any rate, under its present auspices.

EXPERIMENTAL HIGH-PRESSURE GAS-LAMPS IN THE CITY OF LONDON.

With Raising and Lowering Gear.

A SMALL installation of high-pressure gas lighting, on the lines of the report of the Streets Committee of the Corporation of London dealing with lighting in Continental cities, is being carried out on the widened approach to Blackfriars Bridge. It will be remembered that the second "conclusion" in the report was to the effect that "open spaces should be lighted by means of lamps upon standards, fitted with lowering gear." The bridge approach, as now improved, is evidently an "open space" within the meaning of the Committee's conclusions; and as the lighting of the new refuges has only been of a temporary character, since the opening of the bridge, and was about to be made permanent, the South Metropolitan Gas Company, who are responsible for the lighting of the bridge, were called upon by the Streets Committee to carry out the new work in such a manner as would entirely meet their requirements.

The Gas Company, entering fully into the spirit of the Committee's report, have caused to be erected upon the three island refuges north of the bridge very handsome standards of the City pattern; the two on the larger islands between the tramlines and the statue of Queen Victoria carrying two high-power lamps each, on handsomely decorated arms, while the standard on the small rest in the centre of the roadway at the bridge-foot carries one lamp on a swan-neck bracket hanging so as to face the north. Thus the area will be lighted by five high-power lamps each of 1500-candle power, giving 7500 candles duty (actual) at this spot. The standards and lamps are by the Keith and Blackman Company, Limited; the lamps being similar to those erected by them for Fleet Street (the successful superheater of the firm being a special feature in the make-up of the lamp), except that they are what is known as the "1909 pattern," and carry some slight improvement on the firm's original 1500-candle lamp. As with the well-known Fleet Street lamps, the consumption of gas is 25 cubic feet per hour; giving a duty of 60 candles per cubic foot of gas consumed. The lamp services are connected to the new compressor-house of the Gaslight and Coke Company close by, in Tudor Street, where the gas is sent out at a pressure of 60 inches (water gauge).

The lamp-standards are about 20 feet in height over all, and the height of the light about 17 feet from the ground. The lowering gear is out of sight; being self-contained in the column. Two doors, bearing the City Arms upon them, fixed in the base of the column, give access to the winding gear, which is actuated by a small ratchet and drum; the lowering wire running up the inside of the column, and through the arms supporting the globe-shaped lanterns, so that there are no unsightly wires or other appliances to offend the eye. The lamps are held in position by means of a pin with a cone-shaped head and two steel balls; and they can be automatically released for lowering or cleaning by the insertion of a small thimble, which comes into action and dislodges the steel balls by the first turn of the handle of the lowering gear. The lamps are not fitted with any bye-passes, but are lighted by a flash torch similar to the lamps in Fleet Street.

The improvement in the lighting of this busy part of the City, which is known as "the most dangerous crossing in Europe," intensified as it is by the coming of the trams, fully justifies the Streets Committee in selecting this as one of the "open areas" for the purpose of experiment.

Mr. Richard Laybourne, of The Firs, Malpas, Monmouth, who died on the 25th of October last, aged 84, as noticed in the "JOURNAL" shortly afterwards, left estate valued at £103,022 gross, with net personalty £93,387. The testator left £1000 ordinary stock of the Newport (Mon.) Gas Company, of which he was Chairman, to the Newport and Monmouthshire Hospital, for the endowment of a bed.

PRESSURE-RAISING PLANT AT TYNEMOUTH.

By WILLIAM HARDIE, Assoc.M.Inst.C.E.,
Engineer of the Tynemouth Gas Company.

As the subject of high-pressure distribution may now be said to occupy a prominent position in the gas industry, and as there is every indication that it will become a matter of increasing importance in the near future, a short description of the plant recently installed at our works may be of interest to some of your readers, and perhaps helpful to those experiencing difficulties similar to those we encountered at Tynemouth. With this object in view, I have pleasure in offering the following for publication.

It will be necessary, in the first place, to briefly describe our conditions of supply, and mention the particular problem placed before us a short time ago. The area supplied by the Tynemouth Gas Company is divided, to all intents and purposes, into two districts: (1) The town of North Shields, in the immediate neighbourhood of the works; (2), the distant district, including the well-known seaside resorts of Tynemouth, Cullercoats, Whitley Bay, and Monkseaton. The former district is supplied direct through a 24-inch main, and the latter through an 18-inch main. The gas consumption in each district is at the present time approximately equal. The second or distant district has in recent years grown at a very rapid rate, and conditions of supply amply sufficient in the past have become quite inadequate in recent years.

The 18-inch trunk main referred to above is about 1800 yards in length; and up to a recent date it formed the connecting-link between the works gasholders and a two-lift station holder having a capacity of 200,000 cubic feet. From this holder the gas was supplied to the district through a 24-inch main about 3500 yards in length. This holder was filled daily during the periods of light consumption, and during the periods of heavy consumption it gradually emptied—thus augmenting the supply through the 18-inch main, and thereby maintaining the pressure required. The scheme had served a useful purpose for many years; but, owing to the rapidly increasing consumption, the holder emptied at an increasing rate, and, except at times when the works holders were quite full, we had at peak-load a drop in pressure which was far from satisfactory.

In addition to the trouble regarding pressures, we were faced with the question of immediate repair to the station holder. This holder was erected in 1864 by Messrs. Thomas Piggott and Sons, of Birmingham—having been in constant use for forty-five years without having been re-sheeted or repaired, except a few small crown patches which had been put on in recent years. The indications of failure in this old servant were not, under the circumstances, entirely unexpected.

Three schemes were considered.

1.—Rebuilding the gasholder.
2.—Enlarging or supplementing the 18-inch trunk main.
3.—Mechanically raising the pressure at the works end of the 18-inch trunk main, and thereby increasing its delivering capacity.

Scheme No. 1.—The difficulty of carrying out this scheme was great. It was a costly one; and even if a three-lift holder had been erected, the old trouble regarding pressures would have reappeared in a comparatively short period.

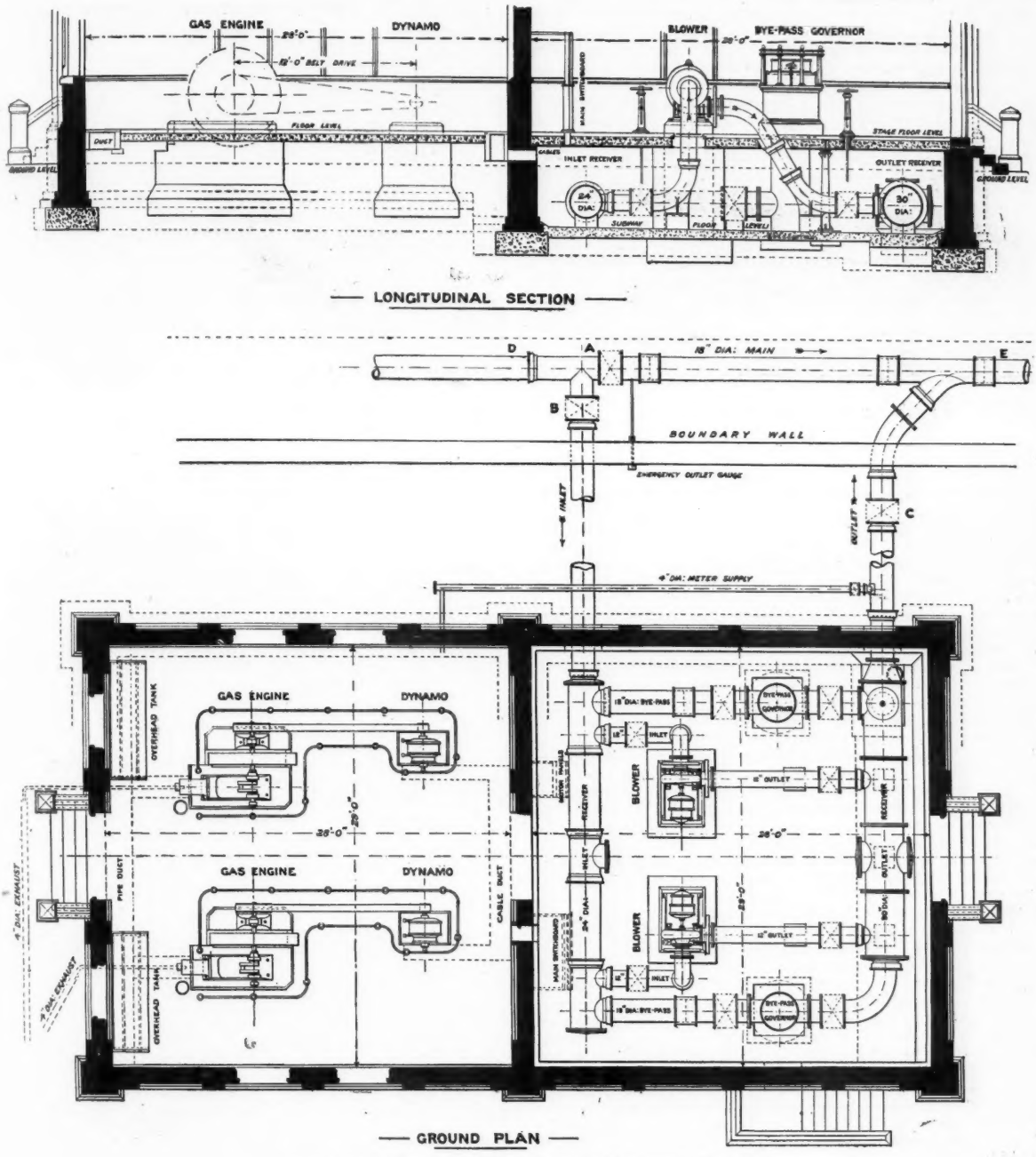
Scheme No. 2.—This scheme could not be favourably considered, owing to the whole pipe-track passing through the main street of the town—a narrow congested thoroughfare, with tram lines, sewers, water-pipes, electric cables, and two 18-inch gas-mains already laid.

Scheme No. 3.—We therefore decided to adopt this scheme as being the most convenient, economical, and permanent method of overcoming the difficulties regarding pressure and consumption of gas in the district already referred to. The station holder is now abandoned, and the pressure-raising plant has been in regular use during the past three months; and the working results in the heaviest period of the year have been most satisfactory.

The plant is fixed in the north-east corner of the works, and is connected to the existing 18-inch trunk main—on the outlet side of the holders. The method of connecting-up with the existing main is shown on the accompanying diagrams. The portion of the 18-inch main between D and E is retained as an emergency bye-pass, with a bye-pass valve at A and main inlet and outlet valves fixed at B and C. Having regard to the fact that the plant is on the direct line of supply to one-half the Company's consumers, special care has been taken to ensure against possible failure or accident, both in the duplicating of plant and the arrangements for bye-passing it.

Each unit consists of a gas-engine and dynamo connected by belt drive, switchboard, motor starting-panel, direct-coupled blower and motor, all necessary cabling, and a safety bye-pass governor. The pipe connections are arranged as shown with cast-iron inlet and outlet receivers; and each blower and governor has an inlet and outlet valve of the vertical type, controlled by indicator columns and handwheels from the stage floor. The connections are arranged with bends of large radius, to offer a minimum of resistance to the flow of gas; and to take up any vibration at the blowers when running at high speed, there are steel expansion joints fixed at the inlets and outlets as shown.

The gas-engines used are each 19 B.H.P., of the "National"

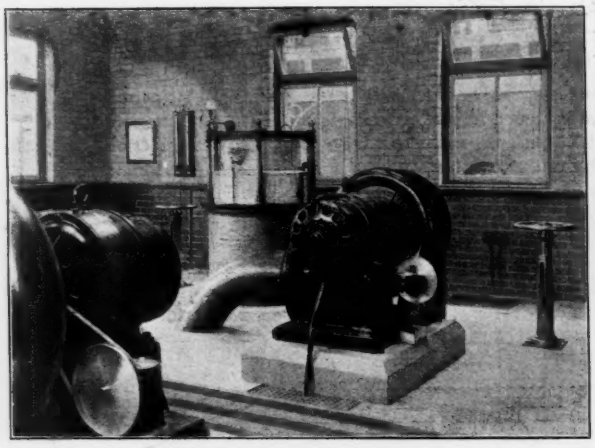


Arrangement of Pressure-Raising Plant at the Tynemouth Gas-Works.

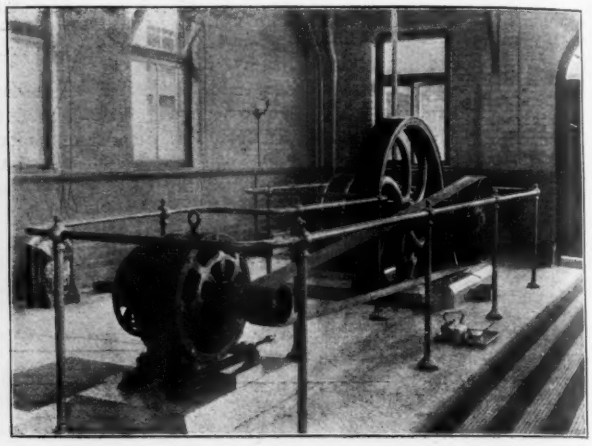
Gas-Engine Company's "Improved Otto" type, each having one heavy fly-wheel, balanced crank, and self-starter. The dynamos are compound-wound, of the "protected" type, and each will generate 11 kilowatts at 250 volts when running at 920 revolutions per minute. The main switchboard, which is duplicated, is fitted with 50-ampere double-pole main switches, single-pole cut-outs, maximum-current circuit-breakers, shunt regulators, voltmeters, and ammeters. There are also 50-ampere double-pole change-over switches, for connecting-up to motor panels, and one 25-ampere switch for charging accumulator hand lamps. The motor-starting panels are fitted with 50-ampere double-pole main switches, 50-ampere single-pole cut-outs, and Brook-Hirst panels, having starting switches fitted with no-voltage and overload releases, and shunt-wound regulating switches attached. The main switchboard is designed to allow of the fullest possible use of plant, thus: Either engine and dynamo will drive either blower; one engine and dynamo will drive both blowers simultaneously; each engine and dynamo will drive one blower, the units working together. It will thus be seen that in an emergency there is considerable latitude of control. Each blower is driven by a direct-coupled motor of 12 B.H.P. maximum. The motors are of the shunt-wound semi-enclosed end-poled type; all ventilating openings being protected by wire gauze dust-screens.

The blowers are of the James Keith and Blackman Company's manufacture, and are known as their No. 5 "Narrow Type" blower, having a fan or impeller secured to the main shaft, and working in a cast-iron outer casing. The impeller consists of a circular disc of sheet steel secured to a shaped cast-iron centre core, which is keyed to the main shaft. On this circular disc, and electrically welded to it, there are 48 sheet-steel blades specially curved to direct the flow of gas forward through the blower casing. For the purpose of stiffening these blades, there is an annular disc of sheet steel electrically welded to the side opposite the circular disc which closes in the ends of the blades. The moving part of the blower which imparts the necessary motive force to the gas is thus formed of a series of curved blades closely pitched and secured between two circular flanges with the one nearest the suction side open in the centre to allow a free passage to the incoming gas. For the purpose of reducing friction to a minimum, and also to take any thrust on the motor shaft to which the impeller is secured, there are ball-bearings fitted at each side of the motor, and also in the blower casing, and the impeller is overhung. The stuffing-box on the casing is packed with lead wool, causing little friction, and preventing the escape of gas.

Though the blowers are designed to allow the gas free passage through the casing while they are not in use, and though this is most advantageous under certain conditions, we decided that, in the event of a sudden failure of the plant, it would not be advisable to rely entirely on the comparatively small passage through the blower. The area through the blowers is equal to about 30 per cent. of the area of the trunk main; and with the fan outlet valve partially closed, as in ordinary working conditions, this would be further reduced. It was therefore decided to fix a form of automatic bye-pass which could be entirely relied upon, and two 18-inch safety bye-pass governors, manufactured by Messrs



Interior of the Blower and Governor Room.



The Gas-Engine and Dynamo Room.

Parkinson and W. & B. Cowan, Limited, were fixed as shown. Subsequent working conditions have proved these governors to be highly efficient; and it would be difficult to find a more reliable form of automatic bye-pass. The pressure-raising plant is fixed in a brick building specially erected for it, and having a white brick finish inside. There is a centre division with an open archway separating the gas-engines and dynamos from the switchboards, blowers, and governors. The two rooms are shown in the photographs. The pressure-room has a subway floor in which every portion of the valves, governors, and pipe connections, gauge-pipes, cables, &c., are easily accessible in case of repair. The stage-floor is composed of steel joists with expanded steel embedded in concrete between same; and the floors in both rooms are covered with wood block flooring embedded in mastic.

The whole of the contract, including gas-engines, dynamos, switchboards, blowers, and motors, also the bye-pass governors and cables, was carried out by the James Keith and Blackman Company, Limited, who, though they had not previously supplied an exactly similar plant, gave most satisfactory guarantees as to the efficiency of their blowers; and, as the working results have shown, our confidence has not been misplaced. During the last three months, the plant has been in more or less regular use; being only laid off when the works holders were full. During this period, we have been able to work with our holders much lower than would have been possible under the old conditions; and in this way we have utilized the top lifts—those portions of the holders which are so generally looked upon as of little value, so far as pressure is concerned—maintaining at the same time excellent pressures by means of the pressure-raising plant.

Under the new conditions, the governor at our distant station, which was previously connected to the outlet of the abandoned holder, is now coupled up to the 18-inch main, and converted into a constant pressure governor, thereby keeping the pressure developed by the blowers at the maximum for which it is loaded. The new safety bye-pass governors at the pressure-house, which are alternately in action, are used as station governors through the whole period the blowers are not in use—usually from midnight to about one hour before sunset the following day.

The blower to be run is started with the outlet-valve closed a short time before it is required, and regulated to a speed which would be sufficient to pass more gas than is wanted. At the time scheduled, the governor is loaded by means of a special water-loading arrangement until it is fully open. The blower outlet-valve is then gradually opened, the governor automatically raised and put out of action, and the outlet pressure slowly raised to the amount required by means of the blower outlet-valve. When the fan is on the town, the governor is thus standing loaded, ready to come into action at any time if needed. At the time scheduled for reducing the pressure, the blower outlet-valve is gradually closed, and the governor automatically comes into action again, the plant is stopped, and the excess of water is slowly run out of the governor tank until the normal night pressure is indicated on the register. During periods of light consumption, the constant-pressure governor is out of action (being fully open); and when the evening pressure is put on at the pressure-house, it automatically rises and comes into action, governing the pressure developed by the blower down to the amount required on the town. The outlet pressure at the works is kept sufficiently high to allow of a margin of pressure of about 1 inch at the inlet of the constant-pressure governor at the maximum consumption; and in this way the inconvenience of a constantly varying drag, or pressure difference, on the 18-inch trunk main is overcome.

The blowers were each specified to be capable of passing 200,000 cubic feet of gas per hour, and develop a maximum pressure of 13 inches water-gauge—*i.e.*, with an inlet of 5 inches, the outlet to be 18 inches water-gauge.

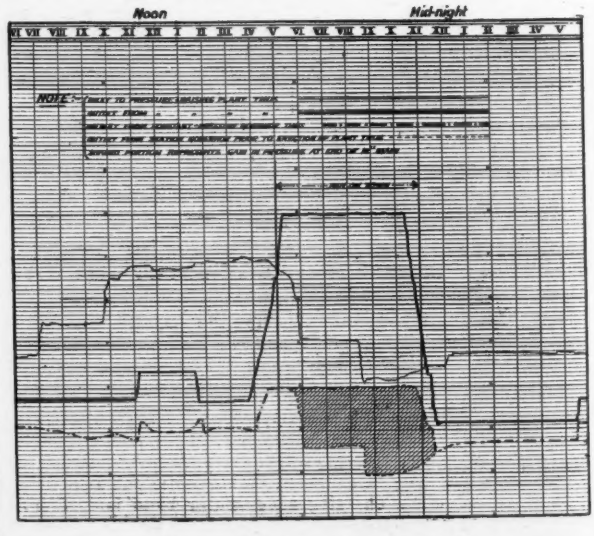
I give below a few of the results of tests taken by us for delivery, while the fans were being put through a series of official tests extending over fourteen days. They furnish useful information as regards deliveries and pressures. It was not convenient, for certain reasons, for us to raise the blower outlet pressure to the maximum specified; but, from the actual figures obtained, there is every reason to conclude that the maximum of 200,000 cubic feet per hour will be obtainable.

TABLE *showing Fan Speeds, Pressures, Volumes, Etc.*

Fan Speed in Revs. per Min.	B.H.P. Required by Motor.	Pressure in Inches.		Pressure Developed by Fan.	Pressure at End of 18-in. Main.	Terminal Pressure Difference.	Rate of Delivery in Cub. Ft. Per Hour.
		Inlet.	Outlet.				
1700	3·3	4·6	9·4	4·8	3·6	5·8	125,500
2400	10·4	4·4	14·2	9·8	5·8	8·4	148,700
2600	12·0	3·9	15 2	11·3	5·2	10·0	177,200
2800	14·2	3·7	16·7	13·0	6·0	10·7	190,760

Note.—Loss of pressure due to altitude = 0·5 inch.

The regulating switches enable the motors and blowers to be run at speeds varying between 1400 and 2800 revolutions per minute—thus affording a wide margin of control. At all speeds there is no oscillation on either inlet or outlet pressures. The blowers have each a margin of 90 per cent. above our present requirements when running at their maximum speed, so that there is an ample reserve for future development. The accompanying pressure register, taken from an actual set, shows clearly the advantages derived from the plant.



Diagrams Taken from Actual Charts.

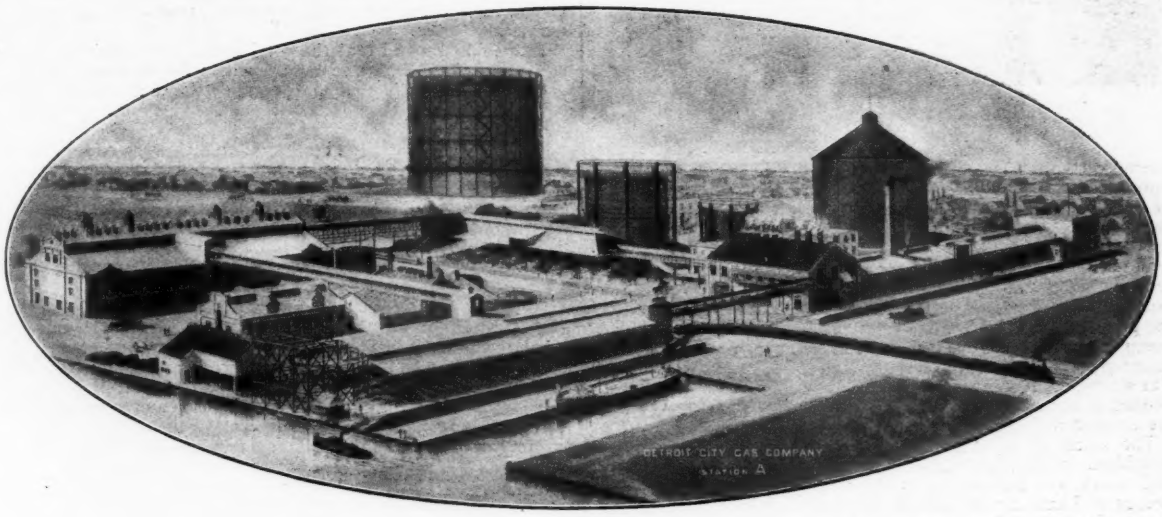
The blowers have not given the smallest trouble since starting, and have fulfilled in every way the guarantee of the James Keith and Blackman Company, Limited.

The Manchester and District Junior Gas Association will next Saturday visit the Wigan Gas-Works and the Kirkless works of the Wigan Coal and Iron Company, through the kindness of Mr. J. Timmins, M.Inst.C.E., and Mr. W. Hewlett. The coke-ovens at the Kirkless works will be first inspected; and here light refreshments will be partaken of. After this, the members will re-join the special cars to be provided by the Tramways Committee, and proceed to the Wigan Gas-Works. Subsequently the Gas Committee will entertain the members at high tea.

DETROIT CITY GAS UNDERTAKING.

By Jacques Abady.

[It may be in the recollection of some of our readers that shortly after Mr. Jacques Abady read his paper, on "Light—and Some Reflections," before the London and Southern District Junior Gas Association, in December last, he left England for America on important business connected with the firm in the direction of which he is associated with Mr. Simmance. Early last month Mr. Abady was in Detroit, and made an inspection of the works of the City Gas Company, of which Mr. Irvin Butterworth is Vice-President and General Manager. The result of that inspection and of his interviews with Mr. Butterworth is embodied in the following article, which we are pleased to publish. Mr. Abady has been having a very enjoyable time. He left Detroit on the 9th ult. for Niagara, with the object of seeing the celebrated Falls and inspecting the power-houses. He will subsequently go to Toronto and Montreal (possibly to Quebec), and then to Syracuse and New York. We cordially wish him a safe completion of what appears to have been up to now a very successful trip.]



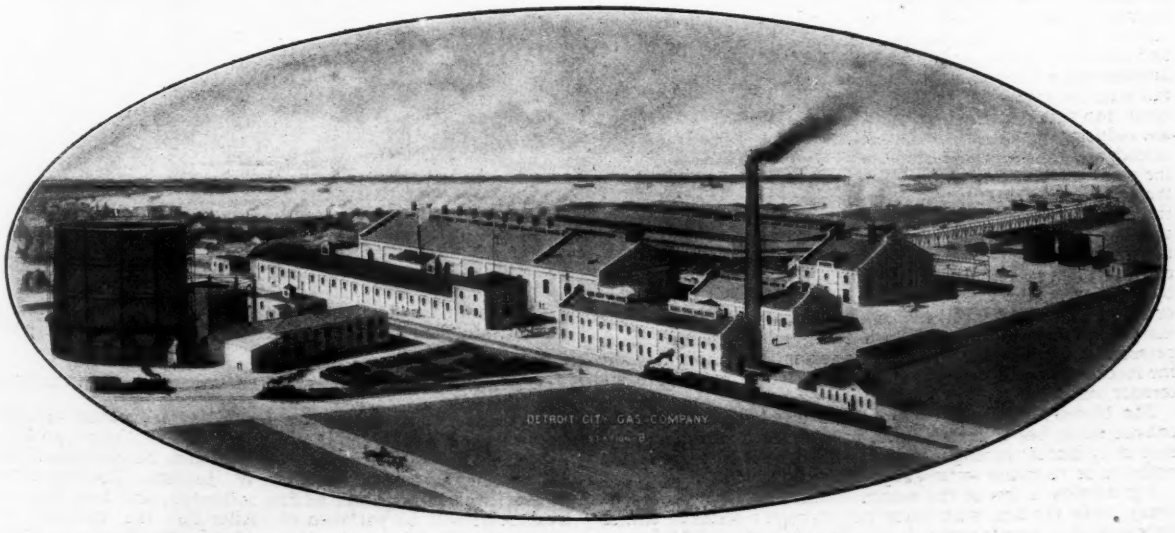
DETROIT CITY GAS COMPANY'S "A" STATION.

Of the making of gas-works there is no end, nor is there any lack of ability, enthusiasm, and energy on the part of those charged with the direction of gas undertakings; so that these qualities cannot be assigned particularly to any special or single concern. In Detroit, however, not only are these qualities apparent to a very high degree, but their exercise is continually called for by the fact that in Detroit, as the city is always growing, gas-works are always being made. It is on account of the almost unique conditions which surround the growth of this city that I send you a few particulars of the gas undertaking here.

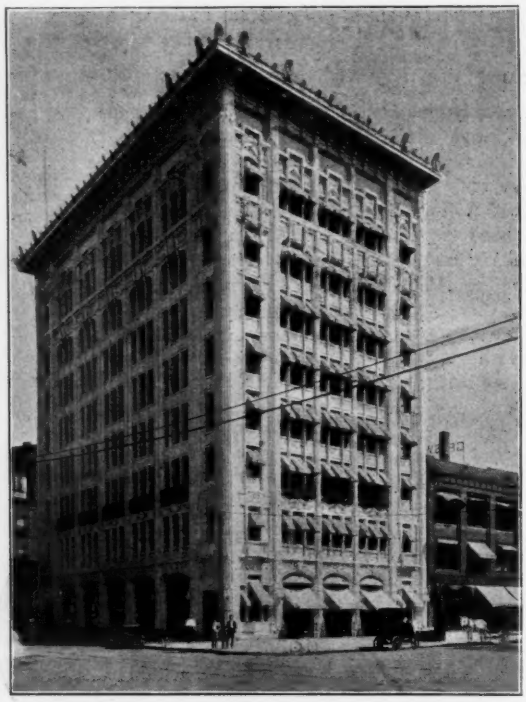
Here, then, is the phenomenon of rapid growth, abundant prosperity, and an apparently unlimited future; and it is shown by a population of now nearly half-a-million, which is practically double what it was ten or twelve years ago. The daily planning of new factories, huge works continually being increased, an unceasing inflow of population, and labour hardly to be obtained for love or money, are features which, to a mind accustomed to the slow-moving Old World, are something to be wondered at. So great are the advantages presented by the geographical situation of the town (it is in practically the centre of the Lake system, and one can throw a stone into Canada), and so conspicuous the energy of its citizens, that, although it is one of the oldest cities in the Middle-West—having celebrated its two hundredth anniversary in 1901, and having until then grown slowly—it is now the ninth largest city in the United States; and I am informed that it leads all other cities in the production of motor-cars, stoves, brass goods, drugs, and medicines. Here, for instance, are the works of Parke, Davis, and Co., Frederick Stearns and Co., Detroit Jewel Stove Company, American Radiator Company, Packard, Ford, E. M. F. Company, and other motor works innumerable, and many other large factories employing thousands of men, with a huge output of manufactured goods.

Harking back to the beginning of things, it is interesting to note that Detroit was the last city to haul down the British flag, which it did some ten years after the Declaration of Independence, and of which fact the wayfarer is reminded by a memorial brass on the fine building of the General Post Office.

From the rapid growth which I have endeavoured to indicate,



DETROIT CITY GAS COMPANY'S "B" STATION.



Building Embracing the Gas Company's Offices, Corner of Washington Avenue, Denver City.

it will be seen that it has been no easy matter to cope with the increased demand for gas, and it must have taxed to the utmost the energy of Mr. Irvin Butterworth and his staff to deal with it. That these efforts have been successful may be seen from two figures—firstly, an increase of from about 1800 million cubic feet in 1904 to just on 3000 millions in 1909, or an increase in five years of about 70 per cent.; and, secondly, that 63 per cent. of the houses are lighted exclusively with gas, while 90 per cent. use gas for cooking.

Before placing before your readers further statistics, and some particulars of the chief gas-making station, and in looking for an explanation as to how this increase has been dealt with so successfully, I am reminded of the doleful jockey in the "Arcadians," who, being a melancholy mummer, exclaims: "I've gotter motter, always merry and bright." This is the keynote which strikes one upon entering the offices (to which the photographs reproduced hardly do justice)—merriness, brightness, and accessibility. The offices of the chief officials are not made on the sanctum sanctorum principle, where one must wait and wait and wait, but so that, if you see your man—be it Mr. Butterworth, Mr. V. F. Dewey, the Engineer, his Assistant, Mr. F. L. Cross, or Mr. Chas. S. Ritter, the Secretary—you go straight into him; and I am able to state, from personal observation, that no business is deemed too unimportant for personal attention. The weary bagman, selling lubricating oils, receives the same brisk, concise, and cheerful treatment as the big contractor; and it is, I think, a very blessing that the American system of accessibility in business has not been left outside the doors of gas offices. It results, I think, in a keenness of perception, an adaptability of mind, and a receptivity for new ideas, which must be beneficial to any undertaking. Without making any comparison, I can only say that the good, keen spirit of *camaraderie* which appears to prevail, is something which is too often lacking in the conduct of business undertakings in the Old Country.

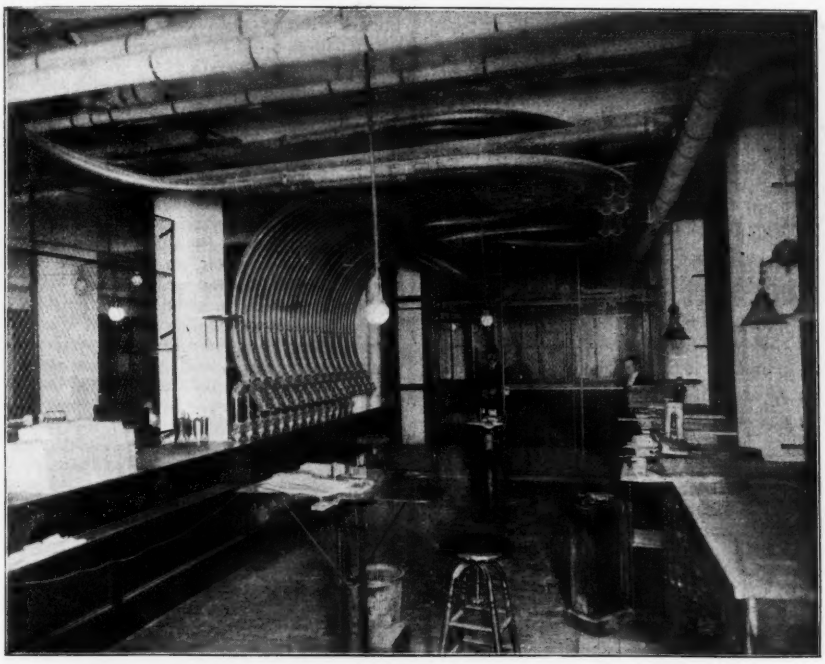
There are two gas stations—the "A" and "B;" and both the works are on the river and about three miles from the centre of the city, and six miles apart. The high-pressure pipe line not only connects the two stations, but circumvents the city. The high-pressure main is 16 inches diameter, and is fed off through about fifty district regulators, which govern the pressure—reducing it to that called for by the requirements of each low-pressure district.

It should be noted that the total gasholder capacity of all the stations is 5½ million cubic feet; whereas the maximum demand per day is 11½ millions. One of the holders is somewhat of a curiosity, being of the enclosed type. This was constructed twenty years ago.

The boosting is effected by three Roots blowers, coupled direct to horizontal steam-engines, each of 225 I.H.P., and the capacity of the pumping chamber of each blower is 52 cubic feet per revolution. The total pressure on the outlet of the blowers, which runs to a maximum of 88 oz., is controlled from the gauge-board by a flexible shaft connecting to the throttle of each engine, which is operated by a lever at the side of the recording gauge, which shows the pressure at the moment. Each of the three engines can be separately controlled by an independent striking gear; and it will be seen that the pressure can be controlled absolutely from the gauge-board by the means described. The details of the type of automatic district governors, which have had much of the personal attention of the engineering staff devoted to their design, show considerable ingenuity, and are well worth studying by any engineer interested in distribution. The exigencies of patents prevent any detailed description for the moment.

The coal used in manufacture comes from the Pittsburg and the West Virginia fields; being conveyed by the railway, which runs right through the works (I am now speaking of Station A, which is the one visited by me; but I understand this is so at both stations). The trucks are run into a coal-shed, which is roughly at right angles to the track of the railway; and there is provision in the shape of a spare coal-store of about 10,000 tons (American). Each truck load is dumped into crushers, and then elevated by a bucket elevator to an overhead coal-store, and carried by a scraper conveyor to the retort-house, which is distant about 100 feet. Work will shortly be commenced on a new retort-house; but the existing one consists of twenty beds of eight horizontal retorts, 28 in. by 17 in. by 10 ft. The beds are back to back; so that on each side of the retort-house there are ten beds of eight. The method of charging and discharging is that of the Bronder mechanical stoker, which is operated by a steam-propelled trolley; the steam pipe-line having flexible joints. Each machine works four scoops at once; and the retort-house opera-

The Vice-President's, Engineer's, &c., Offices on Second Floor.



Basement of Offices—Showing the Tube System to the Several Departments.

tions employ two charging and two drawing machines, and during each twelve-hour shift eleven men are on the retort-house floor. The capacity per mouthpiece is about 11,000 feet per twenty-four hours; and the retorts are charged five times in this period, taking about 415 lbs. each per charge.

The coke is dropped through the retort-house floor into a stationary quenching shelf, which is enclosed and kept free by means of a draught created by a fan. The coke, after being quenched, is raked down into hand-propelled skips, whence it is taken up and screened and dropped into coke-bins in an overhead coke-store. It is then ready for the market. The coke can be dropped directly into carts that back underneath the storage floor, where railway trucks can also run for the direct transmission of the coke to the railroad.

Naturally, the exigencies of seasonal demand make it necessary to store unscreened coke during the summer in a shed, which is a light, steel structure with a timbered roof, and holds about 15,000 tons. A swivelling steam dipping shovel conveys this stored coke into skips when it is desired to draw from the store; and these skips take the coke to be screened in the same way as that which is taken direct from the retort-house.

There is nothing which calls for particular comment in the condensers, washers, or scrubbers; but a very particular control is kept on the hydraulic main pressure by a new form of retort-house control, the invention of Mr. Cross, which, it has been demonstrated to me, controls to 2-10oths of an inch of water. The simplicity and sensitiveness of this control was a matter of considerable astonishment to myself.

There are one or two details in connection with the purifying plant which may be of some interest. The plant is under cover, and consists of eight boxes arranged in two rows. Only oxide is used, and the spent material is conveyed from the purifier-house and shot upon a grid top, which is directly over a cellar. This cellar is heated by steam, which naturally causes an ascension of air, which finds its way through the mass of spent oxide, and so revivifies it without the necessity of employing manual labour to continually turn the material over; this process being only occasionally necessary. After the oxide is sufficiently revivified, the grids are drawn away, and the oxide is dropped below into the cellar, where it is dumped into an elevator, which conveys it to a large fixed bin. This bin is in the centre of four boxes, and has a flexible exit pipe; so that, by opening the damper, the oxide can be distributed down this flexible pipe into one of four boxes at will. The other boxes are filled from this fixed bin, but through the medium of a separate elevated trolley, which carries skips into which the oxide is shot.

At these works no sulphate manufacture is attempted; but the liquor is concentrated up to 15 per cent. of ammonia. It is concentrated by steam distillation, which is automatically regulated according to the temperature of the gases of distillation by a thermostatic control, which shuts off or opens the steam supply.

There is a water-gas plant in operation, consisting of four generators, having a total capacity of about 4,500,000 cubic feet per day. The coke used in the generators is conveyed from the elevator above the retort-house by means of hand-propelled trucks and dropped into fixed hoppers, whence it is shot into the generators. There is in operation in connection with this water-gas plant an automatic steam and air control, or proportioning device, of which probably more will be heard in England at a later date. The power used in the works is obtained from four Stirling boilers with automatic stokers; gas-coal screenings and coke breeze being the fuel used. An interesting feature in connection with the works is the incorporation therein of a Pintsch gas plant, in which oil gas is made in fire-clay retorts, compressed up to 200 lbs., and conveyed by 2½-inch pipes to the depôt, about 2 miles distant. It is then taken off by various railways—such as the Pere Marquette, Wabash, Michigan Central, Grand Trunk, &c.

The tar produced in the works is sold locally, and worked up by a firm of tar distillers.

These, briefly, are the particulars which I was able to gather in the course of a brief visit to the works; and I trust the details therein may be of interest to "JOURNAL" readers. From a personal point of view, I think they cannot fail to be of interest, seeing that the Gas Company have for their Vice-President and General Manager a man who bears a name so well known in the gas profession as Mr. Irvin Butterworth. The Detroit City Gas Company are, by-the-by, one of ten in the United States, owned by the American Light and Traction Company; and the following statistics may not be without interest to those to whom figures are not anathema.

The sales (as I have said) in 1909 were about 3000 million cubic feet; being 37,034 feet per consumer, and 7617 feet per *capita*. The average monthly gas bill of all consumers was $2·43 (about 10s.) The biggest day's output was 11,496,700 cubic feet, on the shortest day (Dec. 21), and the smallest was 5,541,200 cubic feet on July 5. The gas is distributed through 536 miles of street mains to 80,204 consumers. The price varies according to the quantity consumed per month, and is subject, in addition, to a discount of 10 cents (5d.) per 1000 cubic feet if paid within one month from the date of the account. The net price per 1000 cubic feet thus varies considerably; but from the figures given above, it will be seen that the average rate per 1000 cubic feet is just under 80 cents, or 3s. 4d.

Of the total gas sold, there was used—

For cooking in homes	about 50	per cent.
,, ,, ,, hotels, restaurants, cafés, &c.	,, 2½	,,
,, lighting homes	,, 14	,,
,, ,, stores	,, 8	,,
,, ,, factories, shops, &c.	,, 4½	,,
,, heating water in homes, &c.	,, 7	,,
,, ,, rooms, stores, offices, &c.	,, ½	,,
,, industrial fuel in factories, &c.	,, 8	,,
,, gas-engines	,, 2	,,
,, other purposes	,, 3½	,,

A house-to-house canvass of 18,500 representative homes shows that in Detroit about 63 per cent. of the houses are lighted exclusively with gas, 5 per cent. exclusively with electricity, and 12 per cent. exclusively with oil; while 90 per cent. use gas for cooking, and 32 per cent. use coke for heating.

About 18,500 so-called "gas arc" lamps are now in use in Detroit.

The unaccounted-for gas last year was 5 per cent. of the total delivered to mains.

The Company do not handle or deal in gas-ranges, water-heaters, room-heaters, gas-fixtures, or gas-engines; these goods being sold by hardware and fixture dealers, plumbers, &c., in the city. Neither do the Company do gas-piping. Gas arc lamps, Welsbach burners and mantles, portable lamps, and industrial fuel appliances, are, however, sold by the Company.

The Company lay services free of charge to the lot-line of the street; the property owner paying for the service thence to the meter, at the rate of 15 per cent. per lineal foot. No services less than 2½ inches in diameter are laid throughout the district. The

Company repair their own meters; the meter-repairers being paid on a detailed piece-price plan.

The city is divided into three districts to facilitate the payment of bills by consumers; the discount periods expiring on the 10th, 20th, and last day of the months respectively.

The Company buy the surplus gas of the Solvay Process Company's bye-product coke-ovens, located within the city limits, and make in their own coal and water gas plants the balance needed to supply their consumers. About 25 per cent. of the finished gas is water gas. The quality of the gas is 19·50 candles tested in a No. 2 "Metropolitan" argand, and 625 B.Th.U.

WATER LEGISLATION FOR 1910.

In the last number of the "Journal," the Bills promoted by Water Companies for the present session were noticed. We deal to-day with some of the measures introduced by Local Authorities containing proposals in reference to water supply.

By the Abertillery and District Water Board Bill, authority is sought for the constitution and incorporation of a Joint Water Board, consisting of representatives from the Councils of the urban districts of Abertillery, Abercarn, and Risca, in the county of Monmouth, with power to construct water-works, and purchase those belonging to the Councils named. The Board is to consist of seventeen members; nine to be elected by the Abertillery Council, and four each by the Abercarn and Risca Councils. It is proposed to construct an impounding reservoir in the parish of Llanelieu, in the rural district of Hay, in the county of Brecknock; a catchwater drain in the same parish; a service reservoir in the parish of Abertillery; another in the parish of Abercarn; two aqueducts; and various road and railway works. The Board require authority to collect, impound, and appropriate for the purpose of their works the waters of the River Grwyne Fawr, and all the streams and springs intercepted. After the Grwyne reservoir is completed, the Board propose to discharge into the river not less than 750,000 gallons of water in a continuous flow every 24 hours. Ten years are asked for the completion of the works. As soon as any of the water authorized to be taken is available for supply within the limits of the Act, the separate undertakings of the Councils represented are to be transferred to and carried on by the Board. The limits of supply are to be the respective districts of the Councils, and a portion of the urban district of Mynyddislwyn; and the rates are to be 8s. 8d. where the annual value of the premises supplied does not exceed £5, and 9 per cent. when it is above this, with an additional charge for a fixed bath capable of containing more than 50 gallons. Where the supply is by measure, the price is not to exceed 1s. 6d. per 1000 gallons. Borrowing powers are required to the amount of £240,000 for the purchase of lands and easements and the construction of works, £7000 for a trunk main, £2000 for working capital, and such sum as the Local Government Board may sanction for new mains, extension of service-pipes, &c. For the two largest amounts sixty years, and for the working capital ten years, are required for repayment. Surplus revenue is to be apportioned among the Councils, who, of course, are to make good any deficiency in the water fund. Authority is sought by the Board to provide dwelling-houses for persons in their employ. [*Parliamentary Agents: Messrs. Lees and Co.*]

A General Bill promoted by the Bradford Corporation contains a few clauses relating to water supply. The Corporation wish to be empowered to hold lands for the protection of their water and water-works, to require not less than 24 hours' notice before the connection or disconnection of a meter, and to impose penalties for injuring meters, &c. The words "domestic purposes" are not to apply to water supplied for use elsewhere than in, or in connection with, a dwelling-house. The Corporation also wish to be authorized to lay water-pipes in streets not dedicated to the public use. [*Parliamentary Agents: Messrs. Dyson and Co.*]

Authority is sought by the Urban District Council of Clevedon to purchase the undertaking of the Clevedon Water Company, and to supply water within their district and the neighbourhood. The limits are the urban district of Clevedon, and the parishes of Tickenham and Kenn and part of the parish of Walton-in-Gordano, in the county of Somerset. Notice of the intention to purchase is to be given within six months after the passing of the Act; and the transfer of the undertaking is to take place on payment by the Council to the Company or to the Bank of England of a sum equal to the amount of all moneys payable under the provisions of section 83 of the Company's Act of last session and of the Act now being applied for. The necessary borrowing powers are required, and the modes of raising the money and paying it back are specified. Any deficiency in the revenue is to be made good out of the reserve, or out of the district rate if the reserve is inadequate; and separate accounts of the water undertaking are to be kept. [*Parliamentary Agents: Messrs. Crowders, Vizard, Oldham, and Co.*]

The Exmouth Urban District Council wish for authority to construct a well and pumping-station in the parish of Colaton Raleigh, an aqueduct, conduit, or one or more pipe-lines connecting it with the River Otter, and others commencing at the pumping-station and terminating in the parish of East Budleigh, at the south-east corner of the Squabmoor reservoir. Seven years are required for the completion of the works. Power is sought to borrow £18,000 for the purchase of lands and easements and the construction of the works authorized. Fifty years are asked for its repayment; and five years for any money raised to defray the expenses incurred in connection with obtaining the Act. [*Parliamentary Agents: Messrs. Torr and Co.*]

The Fylde Water Board Bill is to empower the Board to construct additional works, comprising a covered service reservoir and a water-tower in the township and borough of Blackpool, eleven aqueducts or pipe-lines, an equilibrium basin in the township of Barnacre-with-Bonds, and a road diversion, all to be completed within ten years. The Board wish to be authorized to borrow £140,000 for the purchase of lands and the construction of the service reservoir, water-tower, and basin, and for the road diversion, and £72,000 for the high-level mains and the extension of existing mains; to be repaid within sixty and fifty years respectively from the dates of borrowing. The Bill contains provisions for extending the period for the repayment of the loan of £137,727 sanctioned by the Local Government Board on Oct. 29, 1904, to sixty years from the date or dates of borrowing; for making the Board's stock a trustee security; and for the appointment of a Secretary to furnish returns to the Local Government Board. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, and Co.*]

The Hastings Corporation are promoting a General Bill by which (*inter alia*) they seek authority to purchase the lands, situate in the parishes of Catsfield, Crowhurst, Bexhill, Hastings, and Westfield, in the county of Sussex, on which their pumping-stations and works have been constructed; and to carry out additional works, consisting of three pumping-stations, a service reservoir, four conduits or pipe-lines, two wells, and two adits or headings. Ten years are asked within which to complete these works. The Corporation require authority to borrow £29,898 for the purchase of lands, and £98,570 for the construction of the additional works specified, both sums to be repaid within sixty years. When water is supplied by measure, the price charged is not to exceed 2s. per 1000 gallons. [*Parliamentary Agents: Messrs. W. & W. M. Bell.*]

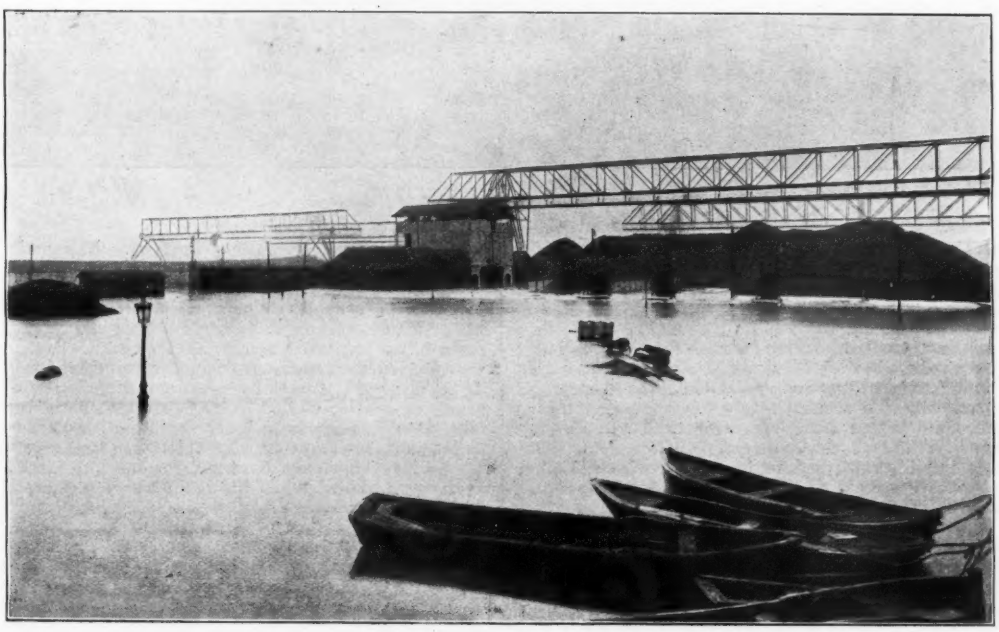
Authority is being sought by the Mountain Ash Urban District Council to construct additional water-works, comprising two intercepting dams, or weirs, in the parish of Penderyn, in the county of Brecknock, a catchwater and a reservoir in the same parish, four aqueducts or pipe lines, an approach road, and a diversion of a stream. Ten years are required for the completion of these works. Borrowing powers to the amount of £80,000 are asked for in respect of the purchase of lands and the construction of works, £5000 for covering the Darranlas reservoir, and £20,000 for the general extension and improvement of the water-works. Sixty years are required for repaying the first-named sum, thirty years for the second, and forty years for the third. The Council wish to be empowered to purchase or sell water in bulk, to sell meters, and to let fittings. The maximum charges for the supply of water for domestic purposes specified in the Council's Act of 1900 are to be altered. [*Parliamentary Agents: Messrs. Baker and Co.*]

A Bill has been promoted to authorize the formation of a Joint Water Board representative of the Rhondda and Pontypridd Urban District Councils, the acquisition of the undertaking of the Pontypridd Water Company, and the construction of works for the supply of water. The Board is to be composed of the Chairmen for the time being of the Rhondda and Pontypridd Councils, six members of the former body, and four members of the latter; and the Chairman of the Board is to be elected by the members. The consideration for the transfer of the undertaking of the Water Company is to be £282,400, and a sum equal to the price at which the movable stock-in-trade, stores, and other materials of the Company stand in the books on the day of the transfer. The Board are also to pay the Company certain engineering costs and charges and other sums specified in the Bill. The Board require power to maintain the existing works and also construct others, consisting of five aqueducts, conduits, or one or more line or lines of pipes, to be completed within seven years. The limits of supply, which are defined in the Bill, include the parish of Eglwysilan, in the urban district of Caerphilly, and the rural district of Llantrisant and Llantwit Fardre, all in the county of Glamorgan. The rates for the supply of water are to be 7½ per cent. upon the rateable value when this does not exceed £18, 6½ per cent. if above this and under £40, and 5 per cent. above £40. But the Board are not to be bound to supply a house or part of a house for any less sum than 8s. 8d. per annum; and a second closet and a fixed bath are to be extras. When water is supplied by measure, the charge is to be according to the quantity taken per quarter—ranging from 1s. 6d. down to 6d. per 1000 gallons. Meter-rents vary with the diameter of the inlet and outlet pipes. Authority is sought to supply fittings, to sell water in bulk, and to lay mains in streets not dedicated to the public use. The Board require power to borrow the amount necessary for the purchase of the Water Company's undertaking, and £377,000 for the purchase of land and the construction of works, to be repaid within sixty years; for new mains, extensions, &c., £30,000, to be repaid within forty years; for working capital £5000, to be repaid within ten years; and the sum necessary for defraying the costs, charges, and expenses of the Act—the last to be repaid within five years from the day of transfer. The miscellaneous provisions of the Bill confer upon the Board power to acquire, hire, erect, and furnish such buildings and offices as they may need; to purchase water in bulk; and to purchase, take on lease, or exchange land. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, and Co.*]

The Worksop Urban District Council are applying for authority to purchase the undertaking of the Worksop Water Company, and supply water within the urban district of Worksop and the neighbourhood. The purchase is to be by agreement or by arbitration under the Lands Clauses Act. The Company will, of course, carry on the undertaking and maintain it till the transfer has been effected. The rates for the supply of water are to be 8s. 8d. where the rateable value of the premises supplied does not exceed £5; where it is under £30, not more than 7 per cent. per annum; and above £30, not more than 6 per cent. per annum. All inns and hotels, whether public or private, of which the rateable value is above £5, are to be liable to a rate not exceeding 7½ per cent., whether or not the rateable value exceeds £30. The charge for water supplied by meter is not to be more than 2s. per 1000 gallons, with a minimum of 10s. per quarter. The Council require authority to contract for affording a supply of water in bulk; and likewise to make bye-laws for securing the cleanliness and freedom from pollution of tanks, cisterns, and other receptacles employed for storing water used or likely to be used by man for drinking or domestic purposes, or for manufacturing any liquid to be used by man for drinking. The Bill contains a provision to the effect that the owner of any dwelling-house which is not provided with a proper and sufficient water supply, who shall occupy or allow it to be occupied, is to be liable to a penalty not exceeding £5, and to a daily penalty not exceeding 20s., unless the dwelling-house was erected before the passing of the Bill, and a supply of water was not then available. [*Parliamentary Agents: Messrs. Baker and Co.*]

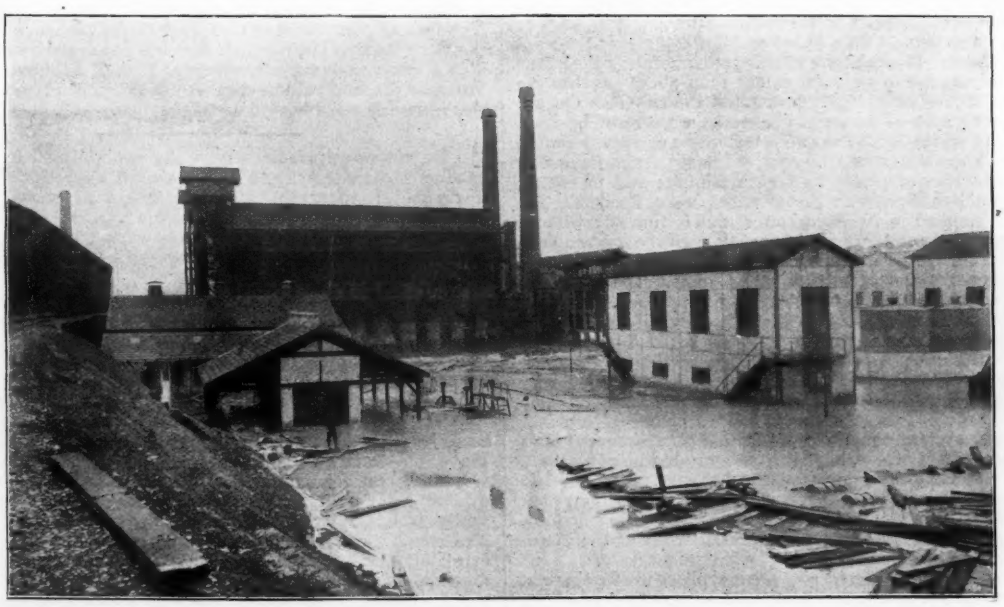
ANOTHER GAS-WORKS UNDER THE WATERS OF THE SEINE.

The Gennevilliers Works of the Société d'Eclairage, &c.

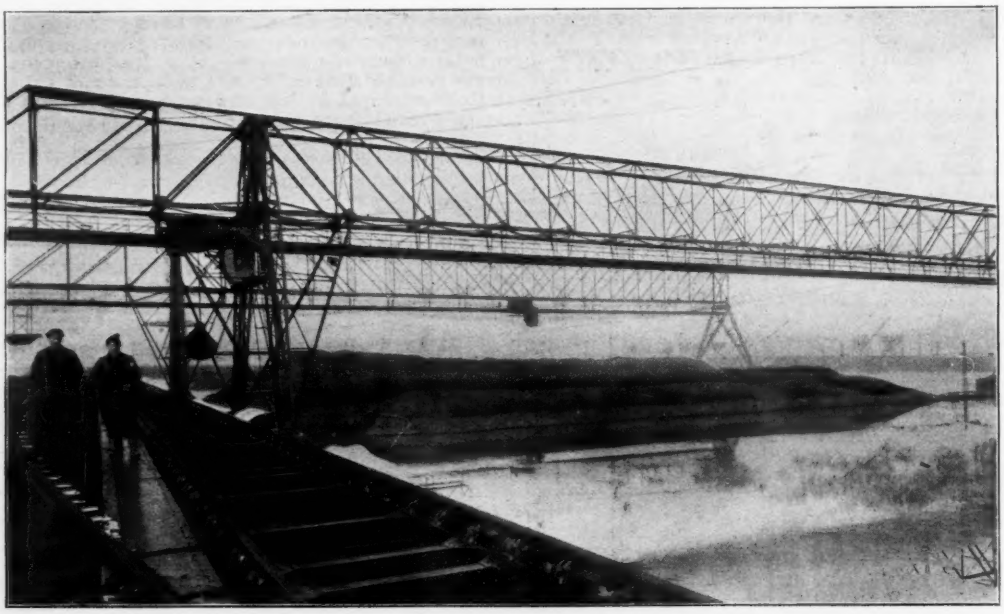


View of the Gas-Works Yard, showing the Coke Ground.

In the "Journal" for the 15th ult., we gave some illustrations, accompanied by a few particulars, showing the effect of the recent floods in Paris on the works of the Continental Union Gas Company at Nanterre. It was then explained that these works are situated to the west of the city, between two arms of the River Seine; and those of our readers who have perused the accounts of the floods which have appeared in the English papers will probably remember that this locality—the Plain of Gennevilliers—suffered severely. The river winds here very much as the Thames does between Greenwich and Woolwich, only in the opposite direction; that is to say, from St. Cloud it flows to the north-east, goes round the bend at St. Denis, and then south-west,



Retort-House containing the Munich Chamber Settings.



Coal Unloading and Transporting Plant.

whereas the Thames flows south first and then north-east. On this peninsula, not very far from the river, stand the new gas-works of the Société d'Eclairage, Chauffage, et Force Motrice, which was formed on the winding-up of the old Paris Gas Company to supply the principal suburbs of Paris. The works were described in the "JOURNAL" about fours years ago; and they have since been referred to and illustrated from time to time. In view of the interest aroused by the publication of the illustrations of the Nanterre works, it seemed that a few showing those at Gennevilliers would form a fitting supplement. These, through the courtesy of M. Chamon, the Managing-Director of the Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz, who is Vice-President of the Société d'Eclairage, we are now able to give, with some particulars which M. Chamon has supplied. It should be explained that the photographs were taken on the 5th ult., when the water was not at its highest; this point having been reached on the 29th of January.

Dealing first with the locality of the works, it appears that the possibility of the peninsula of Gennevilliers being inundated by the waters of the Seine was recognized three hundred years ago, for in 1610 a dyke was constructed for its protection. It was, however, found to be inadequate for the purpose; and accordingly it was heightened in 1811. It is a common saying that the consequences of one's actions are far-reaching. The effect of the raising of this dyke, which was evidence of the foresight of the civil engineers of the time, has been felt nearly a hundred years after, as but for it the gas-works would have suffered to a greater extent than they did. They stand on very solid ground between the railway and the river; and, by another exercise of forethought, the buildings were so located as to be protected from the greatest inundations known for the space of two centuries. They were erected, as well as the retort-settings put up in 1904 and 1905, on ground 5 ft. 3 in. above the highest water level hitherto reached. It was owing to this precaution that the works were not submerged to a greater extent than about 3 feet at the time of the highest rise, which devastated the suburb. On the evening of the 27th of January, the works were running for a production of about 8 million cubic feet per 24 hours, when at seven o'clock the water suddenly poured in with such force that it rose at the rate of nearly an inch a minute; and in twenty minutes all the ash-pans in the furnaces were flooded. Gas making was stopped in twelve minutes, and fortunately without accident to a single employee. At that time all the gas required for consumption had been produced. Next morning the different parts of the works had to be reached in boats. The anxiety of the Manager (Mr. Raoul Frère) may well be imagined.

The primary cause of the inrush of water was, of course, the rising of the river above the top of the dyke; but it was also doubtless attributable to the deterioration of this structure in certain parts. The damage done, though serious, is principally to the plant. Fortunately, the furnaces did not sustain much injury; the bench of twenty new "inclined chamber" settings on the Munich system, equal to a production of rather more than 2¼ million cubic feet of gas, having suffered to hardly any extent. The trunk mains, 36 and 39 inches in diameter, were lifted in several places, their water displacement being greater than their weight, and the trenches in which they were laid being flooded. It is the repair of this damage, and the restoration of the distributing plant to normal condition, that will take most time.

In addition to the Nanterre and Gennevilliers works, those at Boulogne-sur-Seine, Passy, and Alfortville were put out of use by the floods. Some of the mains in Paris were affected, and the supply of gas was stopped in several quarters; but the service has now been almost completely restored. The majority of the municipalities and communes have not yet ascertained the extent of the damage done to public property by the floods. In the case of Paris, the expenditure on account of repairs under this head will probably exceed £100,000. The loss and damage caused in some thirty territorial departments, in which several gas-works were flooded, have been provisionally returned at about £3,000,000. At the close of last week the principal affluents of the Seine were beginning to fall; so that it was hoped that Paris would soon be relieved of anxiety as to the possibility of the recurrence of so terrible a disaster as that with which she has lately been visited. On Sunday afternoon, however, the upward movement of the river was resumed under the influence of freshets in the more rapid affluents of the main stream.

High-Pressure v. Ordinary Gas Lighting for Mills.

In the course of a paper on "High Pressure Gas Lighting for Textile Mills," recently read to the Textile Society of the Manchester School of Technology, Mr. Charles Walton gave the following particulars, from his own observation, of the cost of an installation of high-pressure incandescent gas lighting: "The renewal of mantles worked out at 1·27 per light for 100-candle power burners, which at a cost of 3d. each equals 4d. per light per year. The saving on gas was 53·66 per cent.; the total costs, allowing 10 per cent. depreciation, maintenance, &c., was 28 per cent. over two adjacent years. The true comparison, however, is to be found in the cost per candle power per year. In one year the cost for ordinary lighting was 5·41d.; the following year, with high-pressure lighting, it was 0·728d., and with electric lighting it would be 1·76d., allowing a lamp a life of 1000 hours, which is a high figure." Mr. Walton said he thought he was fully justified in saying that, so far, the high-pressure gas system was considerably cheaper than any other present form of lighting suitable for textile works, and held its own in competition. It was efficient, was generally reliable, and usually simple.

By a typographical error in the editorial article under the heading "The Message and Its Effects," in last week's "JOURNAL," it was made to appear that Mr. Ambrose had increased his make by 7136 cubic feet per ton of coal carbonized. No doubt that gentleman sincerely wishes the statement were true; but it will be readily seen by anyone who has perused his paper that the "7" should have been a 1.

At a recent meeting of the Association of Birmingham Students of the Institution of Civil Engineers, Mr. A. C. Anderson read a paper on "Centrifugal Pumps for Water-Works." The advent of the electric motor and the steam turbine, with high speeds suitable for driving, were, he said, the reasons why centrifugal pumps for water-works had gained their present position. In Canada and America, special pumps were being adopted for fire services. The advantage of the electric motor for quick starting was obvious. For water-works duty, the pumps should be of the soundest construction, and reliable in every way. For main stations, the driving could be done by electric motor or steam turbine; for similar isolated plants, producer gas or oil would be most suitable. The running costs of turbine centrifugal pumping-stations were extremely low, and there was a further saving in buildings and foundations owing to the absence of vibration and the smaller space required for the setts. The author expressed the confident opinion that the high-lift centrifugal pump has a great future before it for water-works service.

THE CAUSES AND RANGES OF VARIATION IN CALORIMETRIC TESTS.

By Thomas Holgate, F.C.S., M.Inst.C.E.

(*Continued from p.* 434.)

Temperature of Circulated and Collected Water.

The possibility of error due to neglect of observing the temperature of the water passed through the calorimeter, when reading its volume, has been pointed out by Mr. Coste*; and it may produce variations of 0·26 Cal. to 1·16 Cal. with ordinary London gas. The same principle is involved in reading the volume of condensation water; and as it is important to ascertain with absolute accuracy the deduction for the latent heat of the steam, the temperature of the water should be observed, if it is inconvenient to weigh the water, as is done at the Leeds University. Another error applicable to the condensation water occurs, according to Mr. Coste, if the instrument is not centred properly.

Comparison of the Observed and the Calculated Calorific Values.

In the "Journal" for Sept. 21, 1909 (p. 750), the writer showed a disparity amounting to 14·51 B.Th.U. with the gas in question. It is now proposed to review that disparity in the light of the present inquiry. Broadly correcting the analytical data for 1·72 per cent. of moisture, the modifications shown in the following table result.

Table XI.—*Showing how the Computed Values are Affected by an Allowance for the Presence of Moisture in the Gas Analyzed.*

Origin of Figures.	Percentage by Volume, Moisture Included.	Gross Calorific Value.	Net Value.	Condensation Value.	Percentage by Volume, Moisture Deducted.	Gross Calorific Value.	Net Value.	Condensation Value.
Observed values	94·7	594·00	542·90	51·10	93·07	594·00	542·90	51·10
Simple combustibles, computed	92·0	520·09	459·41	60·68	90·42	511·14	451·51	59·63
Complex combustibles, by difference	2·7	73·91	83·49	− 9·58	2·65	82·86	91·39	− 8·53

This deduction for water vapour makes a slight improvement in the consistency of the condensation figure, but is by itself quite insufficient. It also so alters the heat attributed to the unsaturated hydrocarbons as to raise the question whether some benzene is present therein. As explained at the beginning of this article (Col. 2 of p. 355), a correction for moisture at the time of analysis might have further affected the comparison; but it seems quite unlikely that it would have been enough.

Having, in Table XI., accounted for a little more than 1 B.Th.U., there remain the following considerations towards the remaining disparity. They are a summary of the influences discussed in this article:

1.—Error due to collection of condensation water over too short a period.

2.—Error due to non-correction of temperature of circulation water and condensed water, possibly equal to 4 B.Th.U. too high on the gross, and 1 B.Th.U. on the condensation value.

3.—Errors due to non-correction for relative humidity [see Tables VII. and VIII. *ante p.* 433], where, as in one instance, the gross, after the application of the Referees' rule, may be 3·04 B.Th.U. too low, and the condensation allowance 4·28 B.Th.U. too low.

So far we have seen that there are a variety of influences at work which if uncontrolled may account for discrepancies too large to be considered negligible. The way to minimize them is also evident; and it is to be hoped that, for the sake of general accuracy, and also for the great benefits that will follow in our estimation of gas-making and gas-using processes, inconsistencies in calorimetric returns may be avoided.

We must now ascertain whether such errors occur in the present practice of calorimetry when the ordinary precautions and experimental skill have been exercised. The instances mentioned by the writer, drawn from the reports on the St. Helens retorts, appear capable of explanation by the inadequacy of the ordinary routine to secure accurate results. In other words, there is no need to attribute faults to the operator of the instrument, but to the methods employed. The instances now to be adduced are drawn from equally reliable sources; and if inconsistency can there be shown, the reasonable conclusion is that the influences already investigated in detail do make their appearance in substantial discrepancies in the ordinary industrial returns.

In the returns given in Mr. Coste's paper, there are deviations from the values calculated from the analysis that are noteworthy; and in some of the series of tests it is evident that there are at work, producing the disparity, influences hitherto insufficiently recognized. Such a question as this must be considered alongside duly authenticated data; and the following are some of the details given as concisely as possible. The collateral data will in most cases be found in Mr. Coste's valuable contribution and in others he has been good enough to furnish which was necessary for my enquiry.

The comparison of the observed gross and net values with the calculated ones shows a general correspondence; but it is impossible, even in such cases, to supersede the former by the latter, because of the unknown value to be attached to the unsaturated hydrocarbons. But this restriction only applies with diminished force to the comparison of condensation values. In fact, the total amount of the condensation value that can be reasonably assigned to the unsaturated hydrocarbons is in a number of cases more than covered by the disparity between the observed and the calculated values. Here, then, is a test of reliability which is entitled to considerable confidence; and its utility is exemplified in its application. In showing its utility, it will be simplest, in the first place, to apply it to a series of gases of definite origin, and of admittedly similar character. These are to be found in Table XII. of Mr. Coste's paper, Section A,* as three gases made from coal at the rate of 9000 cubic feet per ton, high in the percentage of combustibles, especially in hydrocarbons, with only slight differences in the observed illuminating power and gross calorific value, but showing a marked inconsistency in the condensation figures. Merely looking at the net calorific values does not show the anomaly, but a view of the condensation figures does. These are shown in Table XII.

As set forth in Table XII., it is seen that the observed condensation figure of the first sample is almost inexplicable, for 15·3 Cal. are but 8·7 per cent. of the gross, instead of 18·4 Cal., equal to 10·46 per cent., the consistent calculated figure. This view is confirmed by the two following samples; the disparity in the condensation values being 3·1, 0·51, and 0·06 all under-estimated. These may be modified if 1·72 per cent. of moisture be assumed in the gas analyzed; leaving the values + 2·78, + 0·19, and − 0·26. The last two may be thus considered

* See "Journal of the Society of Chemical Industry," Dec. 15, 1909, p. 1234, col. 1.

Table XII.—*Comparison of Observed and Calculated Values of Three Samples of Coal Gas.*

Observed Values in Calories.		Calculated from Analyses.			Condensation Values Per Cent. of Gross.		Calories Observed less than Calculated.		Incombustibles.	
		By Mr. Coste.		By T. Holgate.					Volume Per Cent. Nitrogen.	Relative Weight. H = 1
Gross.	Condensation.	Gross.	Condensation.	Condensation.	Observed.	Calculated.	Uncorrected.	Corrected for Moisture.		
175·8	15·3	177·9	18·4	18·4	8·70	10·46	3·1	+ 2·78	6·2 0·38 CO_2	95·16
179·6	18·2	176·8	18·4	18·71	10·13	10·42	0·51	+ 0·19	6·79	95·06
176·0	18·5	178·7	18·1	18·56	10·51	10·54	0·06	− 0·26	4·28	59·92

Table XIII.—*Showing Relation of Calorific to Illuminating Values of Coal Gases per Table* XII.

Illum. Power in No. 2 Burner Per Cub. Ft. Per Hour.	Values Calculated from Analysis, Corrected for Moisture, in Calories.				Observed Values in Calories.				
	Condensation.	Heat Due to Hydrogen.	Heat Due to Carbon.		Condensation.	Heat Due to Hydrogen.	Heat Due to Carbon.		Compared with Calculated Figure Per Candle.
			Per C. Ft.	Per C. Ft. Per Candle.			Per C. Ft.	Per C. Ft. Per Candle.	
4·278	18·08	111·06	64·74	15·13	15·3	94·0	81·8	19·12	+ 3·99
4·354	18·39	112·96	66·64	15·30	18·2	111·8	67·8	15·57	+ 0·27
4·220	18·24	112·04	63·96	15·16	18·5	113·64	62·36	14·89	− 0·27
4·277	Average of tests of gases, 8 samples. Edinburgh,				15·59	95·75	65·62	15·34	..

* See Mr. Coste's paper, "Journal," Vol. CVIII., p. 816-8.

within the range of experimental error, leaving the other as an irregularity equal to 11 B.Th.U.

Table XIII. shows that the illuminating powers of the three samples are all consistent with the observed gross calorific values combined with the calculated condensation values, but inconsistent in the first sample when the observed condensation value is accepted; for the heat due to carbon then becomes 19·12 Cal., instead of 15·13 Cal. The calculated values for all the samples agree with the average of eight tests (observed values) of Edinburgh gas of similar illuminating power—viz., 15·34 Cal. per candle. It may be remarked that the condensation figure of the Edinburgh gas does not differ much from the abnormal one; but that is explained by the lower gross calorific value of the former. Both sets of gases were too rich to burn at 5 cubic feet per hour in No. 2 burner; about 4½ cubic feet being the rate adopted.

In the Tables XIII. to XVIII., excepting XVI., the writer has held to the observed gross calorific values, because although possibly there may be some error enclosed therein, yet there are no means of assessing it, and it could not seriously affect the comparisons of those tables. The explanation of the anomaly to the extent of 2·78 Cal. in Table XII. may be conjectured after other examples have been considered; but it must be pointed out that the first gas was the only one of the three that contained any carbon dioxide, but only 0·38 per cent. All were free from oxygen, and had 6·24, 6·79, and 4·28 per cent. of nitrogen respectively. In other words, the high percentage of combustibles and the high gross calorific value involving a large air supply are in this case coincident with a low observed condensation figure; while, as shown in Tables XVII. and XVIII., gases having a low percentage of combustibles, a low gross calorific value, and a percentage of water gas admixed—both contributing to a low theoretical air supply—coincide with a condensation figure that is too high.

Tables XIV. and XV. give the results of investigating six samples of coal gas, five of which are Metropolitan and one from the St. Helens vertical retorts. They are of lower quality than those in Tables XII. and XIII., and show a higher weight of incombustible constituents, as well as a diversity in the departure of the observed calorific values from the calculated ones; for while one is 1·27 Cal. too much, another is 0·93 too little—after correcting the analyses for 1·72 —per cent. of moisture. In Table XV. these divergences are brought into two classes—the first showing − 1·69 Cal., and the second + 1·61 Cal., for the heat due to carbon per candle. Taking the table as a whole, we get an average which is apparently satisfactory; but it is only a fortuitous balance of two unsatisfactory sections.

Table XVI. deals with Metropolitan gases containing water gas; but the figures are unchecked, so far as the writer is concerned, by any analysis. It embodies in the third column the condensation figure calculated by Mr. Coste, assuming the unsaturated hydrocarbons as propylene. But as this assumption cannot make much error in the condensation figure, it is used as a check on the observed value. Generally, the result is confirmatory of that obtained by computation from analyses of similar gases by the writer given in Tables XVII. and XVIII. They reveal an important fact—viz., that in fourteen samples out of sixteen the observed condensation figure is above the calculated, and presumably the truer, one. The effect of this is to depreciate the net value attributed to the gas in the examiners' returns; for though a portion of this error may be in practice coincident with a slight appreciation of the gross value, yet this is unlikely to compensate for the loss mentioned. The explanation of this deviation is not quite obvious; but it appears to be related to the weight of incombustible elements. This relation is shown by the numerals placed in the last column of Tables XVII. and XVIII., showing the order of the two sets of figures. The effect of a high percentage of incombustibles is very much like adding to the air supply, with the further drawback of the extra weight of the carbon dioxide. And as the gases in question were all tested in a Boys calorimeter, which has a fixed air passage space, and they were gases (by reason of their water-gas content, and low hydrocarbon content) requiring a small air supply, all three factors seem to have combined to produce an abnormal

TABLE XIV.—*Showing Disparities between Values Observed and Calculated from Analyses—Five London Coal Gases.*

	Gross Observed Calories.	Condensation Value.		Condensation Value per Cent on Gross.		Observed Condensation.		Ditto, Corrected for 1·72 per Cent. Moisture.		Incombustibles, Volume per Cent.				Incombustibles, Relative Weight. H=1
		Observed.	Calculated.	Observed.	Calculated.	Greater than Calculated.	Less than Calculated.	Greater.	Less.	Total.	CO_2.	O_2.	N_2.	
	166·6	17·3	17·4	10·3	10·4	..	0·1	0·2	..	8·09	1·75	0 52	5·82	128·5
	152·6	18·4	17·4	12·07	11·42	1·0	..	1·27	..	..	not	given	..	..
	145·7	16·4	15·5	11·25	10·64	0·9	..	1·17	..	7·81	2·11	1·05	4·65	126·3
	144·5	15·0	15·84	10·38	10·93	..	0·8	..	0·57	8·01	1·48	0·26	6·27	124 5
	144·3	14·7	15 8	10·18	10·95	..	1·1	..	0·83	4·25	1·00	0·05	3 20	67·6
	143·4	14·5	15·7	10·11	10·95	..	1·2	..	0·93	10·71	2·85	0·20	7·66	173·1
Aver..	149·5	16·05	16·27	10·71	10·88	..	0·22	0·05	..	7·77	1·84	0·42	5·51	124·0

TABLE XV.—*Showing Relation of Calorific to Illuminating Values of Coal Gases per Table XIV.*

	Illum. Power in No. 2 Burner.	Values Calculated from Analyses.				Observed Values in Calories.				
		Condensation.	Heat Due to Hydrogen.	Heat Due to Carbon.		Condensation.	Heat Due to Hydrogen.	Heat Due to Carbon.		Compared with Calculated Figure per Candle.
				Per Cub. Ft.	Per Candle.			Per Cub. Ft.	Per Candle.	
London . . .	3·642	17·10	105·0	51·6	16·91	17·3	106·2	60·4	16·584	−0·33
,, . . .	3·404	17·13	105·2	47·4	13 93	18·4	113·0	39·6	11·63	−2·30
,, . . .	2·896	15·23	93·6	52·1	17·99	16·4	100·7	45·0	15·54	−2·45
Average of three tests . . .	3·314	16·49	101·3	53·7	16·27	17·37	106·6	48·3	14·58	−1·69
London . . .	2·920?	15·57	95·64	48·86	16·73	15·0	92·1	52·4	17·94	+1·21
St. Helens . .	3·112	15·53	95·4	48·9	15·71	14·7	90·3	54·0	17·35	+1·64
London . . .	2·930	15·43	94·8	48·6	16·59	14·5	89·0	54·4	18·56	+1·97
Average of three tests . . .	2·987	15·51	95·27	48·79	16·34	14·7	90·5	53·6	17·95	+1·61
Average of the six tests . . .	3·151	16·00	98·27	51·24	16·31	16·05	98·55	50·97	16·27	−0·04

TABLE XVI.—*Showing Disparity of Observed and Calculated Values, London Mixed Gases.*

	Gross Observed Calories.	Condensation Value.		Condensation Value per Cent. on Gross		Observed in Excess of Calculated.
		Observed.	Calculated by Mr. Coste.	Observed.	Calculated.	
	150·3	17·1	15·4	11·4	10·4	1·7
	148·0	17·7	15·0	11·96	10·4	2·7
	145·7	16·4	15·1	11·2	10·4	1·3
	143·5	15·6	15·0	10·8	10·4	0·6
	143·5	15·8	14·0	11·01	9·8	1·8
	143·1	16 9	14·4	11·8	10·28	2·5
	143·0	15·3	15·0	10·7	10·4	0·3
Av. of seven.	145·3	16·4	14·84	11·27	10·30	+1·56
	145·8	14·8	15·5	10·15	10·52	−0·7
	143·3	15·0	15·5	10·47	10·71	−0·5
Av. of two .	144·55	14·9	15·5	10·31	10·615	−0·6
Av. of nine .	145·1	16·06	14·98	11·052	10·368	+1·08

TABLE XVII.—*Showing Relation of Calorific Values, Calculated and Observed—London Mixed Gases.*

	Gross Observed Calories.	Condensation Value.		Condensation Value per Cent. on Gross.		Observed in Excess of Calculated.	Ditto, after Correction for 1·72 p. ct. Moisture.	Incombustibles in the Gas.					
								Volume per Cent.				Relative Weights. H=1	Order of Weights.
		Observed.	Calculated.	Observed.	Calculated.			CO_2.	O_2.	N_2.	Total.		
	144·8	15·6	14·4	10·8	9·9	1·2	1·45	1·45	0·73	7·15	9·33	143·68	2nd
	145·1	16·0	15·2	11·02	10·4	0·8	1·06	1·74	0·37	3·24	5·35	89·56	1st
	145·2	16·7	13·65	11·50	9·4	3·05	3·28	2·13	0·28	12·02	14·43	219·62	5th
	141·4	16·9	13·5	11·95	9·54	3·4	3·63	5·00	0·00	10·20	15·20	252·80	7th
	143·5	15·6	14·5	10·87	10·10	1·1	1·35	1·51	0·53	9·79	11·83	178·76	4th
	143·2	16·9	13·7	11·80	9·57	3·2	3·43	3·83	0·29	9·86	13·98	226·94	6th
	150·3	17·1	14·82	11·34	9·86	2·28	2·53	0·00	0·27	11·10	11·37	159·72	3rd
Aver.	144·8	16·4	14·253	11·326	9·824	2·147	2·39	2·24	0·35	9·05	11 64	181·58	..

cooling of the exit gases, with the result shown by the tables. The lowered moisture content of the exit gases would come into play, and also the error set forth earlier, due to the attribution of sensible heat to such water vapour as though it had been cooled down from 100° C. This tendency, resulting from excessive dilution, seems to be indicated by the results in Table XIX., where the rate of gas burnt was low. But the experiments are not sufficiently numerous or specific to justify any positive deduction as to the cause.

In Tables VII., VIII., and IX. of Mr. Coste's paper are given experimental data, which, when dissected, as in the following table (XIX.), show that, with the same gas and similar calorimeters, distinctly variable results were recorded for the condensation values.

TABLE XVIII.—*Showing Relation of Calorific and Illuminating Values of London Mixed Gases, per Table XVII.*

	Values Calculated from Analyses.				Observed Values in Calories.					
	Illuminating Power in No. 2 Burner.	Condensation.	Heat Due to Hydrogen.	Heat Due to Carbon.	Condensation.	Heat due to Hydrogen.	Heat Due to Carbon.		Compared with Calculated Figure per Candle.	Order of Disparity.
				Per Cub. Ft. / Per Candle.			Per Cub. Ft.	Per Candle.		
	3·33	14·15	86·92	57·88 / 17·36	15·6	95·8	49·0	14·7	− 2 66	3rd
	3·316	14·94	91·8	53·3 / 16·08	16·0	98·28	46·82	14·12	− 1·96	1st
	3·242	13·42	82·4	62·8 / 19·37	16·7	102·6	42·6	13·14	− 6·23	5th
	3·160	13·27	81·5	59·9 / 18·95	16·9	103·8	37·6	11·90	− 7·05	7th
	3·458	14·25	87·53	55·97 / 16·18	15·6	95·8	47·7	13·79	− 2·39	2nd
	3·362	13·47	82·74	60·46 / 17·98	16·9	103·8	39·4	11·72	− 6·26	6th
	3·612	14·57	89·5	60·8 / 16·83	17·1	105·0	45·3	12·5	− 4·33	4th
Aver.	3·354	14·01	86·05	58·73 / 17·53	16·4	100·72	44·06	13·12	− 4·41	..

The first section of Table XIX. shows that with two Boys calorimeters the first comparison was almost identical; while the succeeding four averaged a variation of 1 Cal. for the No. 1 instrument over the No. 26. The excess was always for the same instrument; but what is even more noteworthy is that the third test shows a condensation value of 19·8 Cal., equal to the high percentage 13·5. This figure is difficult to understand; but it is confirmed partly by the 18·5 Cal. in the No. 26 instrument. The two sets of figures show extremes of 15·8 Cal. and 19·8 Cal., or a range of 4 Cal., equal to no less than 22 per cent. of the mean value, and

TABLE XIX.—*Showing Behaviour of Different Calorimeters on the Same Gas and with Different Rates of Flow.*

—	Boys No. 1.		Boys No. 26.		Compared with No. 26. Calories	Boys No. 26.		Junkers.		Compared with Boys No. 26. Calories.	Cubic Feet per Hour.	Boys.		Junkers.		Cal.
	Calories.	Per Cent.	Calories.	Per Cent.		Calories.	Per Cent.	Calories.	Per Cent.			Calories	Per Cent.	Calories.	Per Cent.	
	16·6	11·37	16·5	11·30	+0·1	14·8	10·21	15·0	10·29	+0·2	5	15·4	10·52	14·4	9·86	1·0
	16·8	11·52	15·8	10·90	+1·0	14·9	10·27	14·7	10·06	−0·2	4	15·0	10·34	14·3	9·85	0·7
	19·8	13·50	18·5	12·59	+1·3	14·4	9·78	14·7	10·02	+0·3	3	16·1	10·99	..	..	..
	17·0	11·50	16·0	10·97	+1·0	14·9	10·21	13·5	9·35	−1·4	2	15·5	10·75	14·9	10·15	0·6
	17·1	11·70	16·4	11·21	+0·7	14·0	9·68	14·8	10·20	+0·8						
Average of five tests	17·46	11·92	16·67	11·39	+0·8	14·5	10·08	14·6	10·09	+0·1	Average of four tests	15·5	10·65	..	..	..
Average of four tests	17·67	12·05	16·67	11·42	+1·0	14·1	9·80	14·8	10·24	+0·7	Average of three tests	15·3	10·54	14·53	9·95	0·77
Burning 2½ cubic feet per hour	15·6	10·70	..			14·51	10·00	14·58	10·03	+0·07						

this within a set of four tests after they began to vary. Boys No. 26 showed a lower condensation figure —viz., 15·6 Cal.—when the gas was burning at the rate of 2½ cubic feet per hour, against the average value of 16·67 Cal. when burning 4 to 5 cubic feet per hour.

The second section of Table XIX. shows the results from a Junkers calorimeter compared with the Boys No. 26. In this series, the latter instrument shows more uniform returns —the lowest being 14·0 and the highest 14·9 Cal.; while the Junkers gives 13·5 and 15·0 Cal. respectively. Out of seven pairs of tests, the Junkers instrument gave in five of them a higher condensation figure and in two of them a lower one; these differences varying from − 1·4 to + 0·8, or a total of 2·2 Cal.

In the third section of Table XIX., the effect of a variable rate of flow is set forth; showing again a lower condensation figure for the Junkers tests, and apparently—under the conditions then prevailing—a tendency to rise in both instruments when the consumption came below 4 cubic feet per hour. This is contrary to the behaviour of the single test for the first section of the table. The most marked individual disparity in the second section is where a gas giving 14·9 Cal. in the Boys No. 26 yielded only 13·5 Cal. in the Junkers; a falling off, quite suddenly in the series, of 1·4 Cal., equal to 10 per cent. of the mean value. This occurs within a series of seven pairs of tests that otherwise show moderate disparities—thus displaying the subtle nature of the influences at work.

An instance recently occurred where the change of atmospheric temperature and of humidity was rapid, and it was possible to trace its effect upon the returns for gas tested on the two days Dec. 21 and 22, 1909. From the Meteorological Office readings of the wet and dry bulb thermometers at St. James's Park, the writer has calculated the relative humidities shown in Table XX.

TABLE XX.—*Showing Rapid Change of Atmospheric Temperature and Humidity.*

Hour of Reading.	7 a.m.		1 p.m.		6 p.m.		Average of the Three.	
Date of Reading.	Temperature on Dry Bulb Thermometer.	Relative Humidity.	Temperature on Dry Bulb Thermometer.	Relative Humidity.	Temperature on Dry Bulb Thermometer.	Relative Humidity.	Temperature on Dry Bulb Thermometer.	Relative Humidity.
	Deg. Fahr.		Deg. Fahr.		Deg. Fahr.		Deg. Fahr.	
Dec. 21, 1909 . .	27·0	82·3	35·2	68·0	34·5	96·88	32·23	75·73
,, 22, ,, . .	43·6	96·48	53·0	93·3	53·6	94·29	50·07	94·69
Rise in 24 hours .	16·6	14·18	17·8	25·3	19·1	17·41	17·84	18·96

Out of seventeen testing stations, one (Holloway) showed no change in the condensation figure, being 11 per cent. each day; six showed a reduction, the most being from 11·4 to 10·5 = 0·9 per cent.; while ten cases showed an increase, the most being Stoney Lane, Tooley Street, S.E., from 10·7 to 14·4 = 3·7 per cent. On Dec. 21, 1909, the average of the whole was 10·8 per cent.; and on Dec. 22, 11·3—a rise of 0·5 per cent., equal to about three-fourths of a calorie. The average gross value at Stoney Lane during that week was 151 Cal.; the net, 133·1 Cal.; the condensation 17·9 = 11·85 per cent. Upon 151 Cal., the 3·7 per cent. jump would amount to 5·6 Cal.; while if the departure from the mean value only be taken, the abnormal day represents 14·4 − 11·85 = 2·55 per cent., or 3·85 Cal.

An instance of variation in calorimetric readings recently came to the writer's notice, where a use of the two types of instruments mentioned in this article showed a lower net value from the one. This was, as a consequence, discarded, and the other substituted for the regular daily use.

It is quite evident that the disparities reached in practical work, may have an important effect now that, under recent legislation, calorimetric tests may involve forfeitures.

(To be concluded.)

Midland Association of Gas Managers.—As briefly announced in the "JOURNAL" last week, the annual meeting of the Association will be held on Thursday, at the Grand Hotel, Birmingham. According to the circular issued by the Hon. Secretary (Mr. Harold E. Copp, of West Bromwich), a new member will be elected, the President (Mr. Vincent Hughes, of Smethwick) will deliver his Inaugural Address, and Mr. Alfred T. Harris, of Market Harborough, will read a paper entitled "Experiences with Semi-Vertical Retorts, and Notes on Carbonizing Systems and Results." Messrs. S. Glover (St. Helens), T. Glover (Norwich), and J. F. Bell (Derby) have consented to open the discussion, and give the results of their recent experiences in carbonization. A report by the Committee on the subject of the revision of the rules will be considered. The members will afterwards dine together.

THE GAS LIGHTING OF TO-DAY.

Earl's Court has been the scene of many exhibitions; and with one in particular it will for a long time to come remain associated in the memories of those engaged in the gas industry. There is an exhibition to be seen there now, of the trade order; and, it may be incidentally remarked, it is a very good one, too. The title is the Wholesale Furniture Manufacturers' Co-Operative Exhibition, of the series of which it is the seventh. It was not, however, the attractive contents of the various stalls that last week induced a representative of the "Journal" to visit once more the familiar Queen's Palace, Ducal Hall, and Queen's Palace Annexe, but a rumour that there was to be seen there a first-class installation of high-pressure gas-lamps. Anticipation in this case did not exceed the pleasure of realization; for the Gaslight and Coke Company have admirably carried out the task of lighting up the exhibition. The accompanying illustrations show what has been done, and how well the stands are illuminated. Side by side with their brilliant high-pressure gas rivals, the unused electric arc lamps look disconsolate indeed.

Ducal Hall, Earl's Court Exhibition.
(Photograph taken by High-Pressure Gas-Light.)

Praiseworthy, however, as the installation would be under any circumstances, it is rendered even more creditable when one considers its temporary character; the exhibition being no more than a nine-days' affair. Housed in a make-shift sort of shed, are two Keith compressors, driven by "National" gas-engines, which are merely placed on a timber platform. It is the practice to use one of these in the daytime, and the other at night; the one performing the first-named part of the work being lower geared than the other. The gas is supplied to the compressors through two 4-inch mains; and it leaves them through two 2-inch and one 1½-inch pipes—the latter being for the annexe. These are controlled by cocks, so that the lighting may be partial, if desired. Though installed in this somewhat primitive manner, no trouble whatever has been given by either engines or compressors, which are highly spoken of by those in charge.

Queen's Palace, Earl's Court Exhibition.
(Photograph taken by High-Pressure Gas-Light.)

Both the Queen's Palace and the Ducal Hall were already provided with three runs of 2-inch pipes, which were left in position after the Gas Exhibition; but, even so, the temporary lighting installation now under notice necessitated some 2¾ miles of additional piping. The whole of the work of preparing for the lighting was accomplished by thirteen fitters, with their mates, in a fortnight. The lighting throughout is of one character; but choice may be made, for specific reference, of the Queen's Palace. Here are to be seen (divided over the three runs of pipe) no less than 72 three-burner Sale-Onslow lamps, worked at a pressure of about 50 inches. The candle power of these lights is 500 per burner—making 1500 candles per lamp. This would give an illumination for the Queen's Palace of 108,000-candle power; and the Ducal Hall and Annexe are proportionately well lighted. In fact, this general installation constitutes almost the whole of the lighting of the exhibition. Such lighting as is required by individual stalls, owing to their being covered in, &c., is furnished by 200 Bland inverted burners, which derive their gas from the low-pressure supply.

It was noticed that the exhibition is heated by 55 of Cox and Son's (Torquay) gas-heating stoves, having four burners; while in the adjacent Empress Hall Skating Rink there are 50 stoves of similar pattern, but each fitted with twelve burners. In conclusion, it may be said that no better way could possibly be found of inducing full appreciation of the excellent qualities of the gas lighting of the Queen's Palace than by taking a person direct from there to the electric-arc lighted Empress Skating Rink.

NAPHTHALENE TROUBLES REMOVED IN THE TYNEMOUTH DISTRICT.

In the course of the proceedings at the annual general meeting of the Tynemouth Gas Company last Thursday, which are noticed elsewhere, the Chairman (Mr. J. B. Williamson) read a letter from the Engineer (Mr. William Hardie) containing the following particulars in regard to the successful efforts made by him to get rid of naphthalene troubles.

For about ten years we have been trying various expedients for getting over the nuisance of stoppages due to naphthalene in consumers' service-pipes and on the gas-works; and I am pleased now to report that the efforts have at last been successful, and that naphthalene troubles no longer exist. I have had an opportunity lately of inspecting many of our main-pipes, both on the works and in the district, and when I broke-out connections to the old gasholder at Low Lights, and in no case was any trace of naphthalene found.

Much benefit was experienced by the reversible annular condenser on the principle of that described by Mr. Charles Carpenter, of the South Metropolitan Gas Company, in 1895. By the use of this condenser, we were able to reduce the naphthalene down to an average of 5 grains per 100 cubic feet of gas.

This was not found sufficient to give relief; and, after using various oils for washing the remaining naphthalene, I was able, owing to experiments carried out in our gas-works laboratory by my Assistant (Mr. G. Duncan), to prepare a specification for an oil which has given us total relief, and cost during last year only 1-25th of a penny per 1000 cubic feet of gas treated. The gas now regularly contains less than one grain of naphthalene per 100 cubic feet.

As showing the advantage to the Company, I may say that whereas the average number of stoppages due to naphthalene for the three years before we commenced using this special solvent was 4140 per annum, in 1907 they were reduced to 807, in 1908 to 238, and in 1909 to 30. The reason why they did not cease as soon as we commenced using this special solvent was owing to the large quantities of naphthalene lying deposited in the mains and services, which, of course, took time to dissipate.

In a paper on "The Pollution of Streams by Spent Gas Liquors from Coke-Ovens, and the Methods Adopted for its Prevention," Dr. H. Maclean Wilson, Chief Inspector of the West Riding Rivers Board, pointed out that these liquids could be dealt with so as to prevent stream pollution; and he said the Board felt the time had arrived when they must do their utmost to enforce the law.

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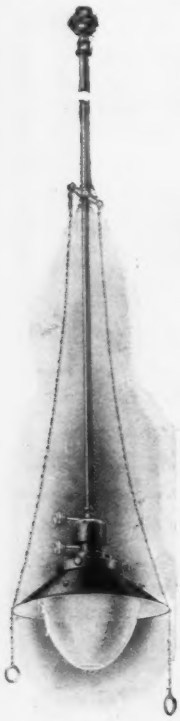

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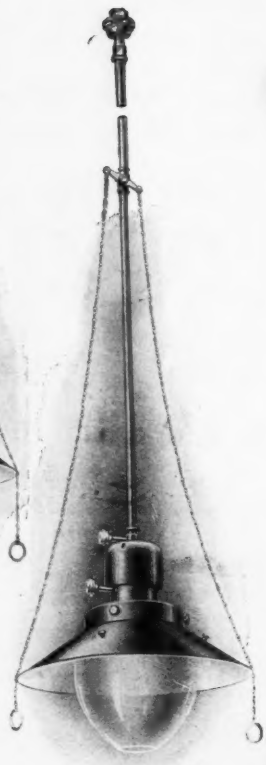
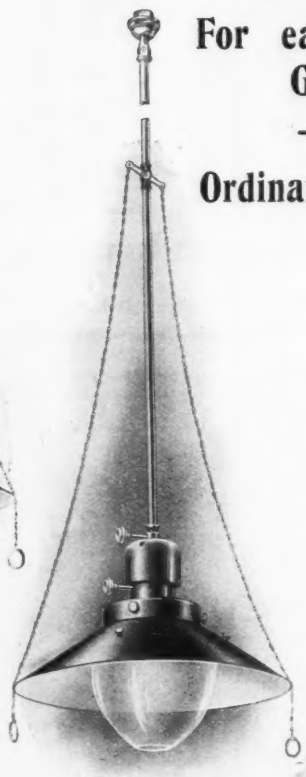
< 10-inch > Reflector. 90-Candle Power. No. 1954.



< 12-inch > Reflector. 180-Candle Power No. 1955.



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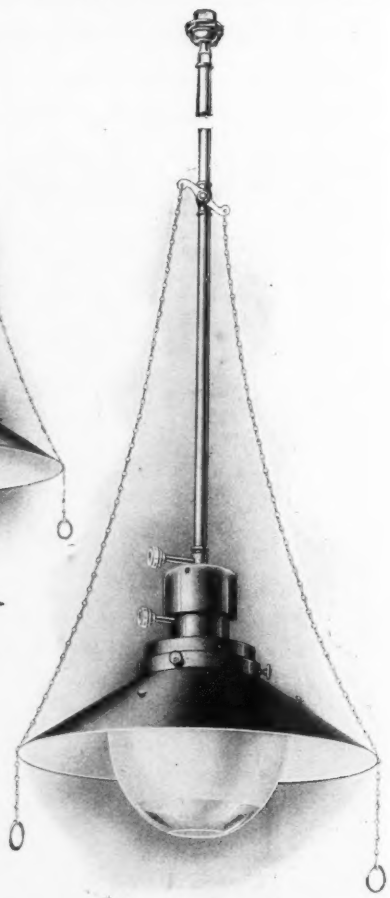

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MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Annual Meeting in Manchester.

The Fortieth Annual Meeting of the Institution was held on Saturday, in the Grand Hotel, Manchester. Mr. J. W. Morrison, of Sheffield, the retiring President, occupied the chair at the opening of the proceedings; being supported by Mr. H. Kendrick (Stretford), the President-Elect, Mr. S. Glover (St. Helens), and Mr. W. Whatmough (Heywood), the Hon. Secretary.

Letters of Apology.

Among the letters of apology read by the Hon. Secretary was one from Mr. Lunt, a Director of the Stretford Gas Company, who desired to extend to Mr. Kendrick good wishes on his election as President of the Institution; adding that the honour done to Mr. Kendrick was much appreciated by himself and the whole of the members of the Board of the Stretford Gas Company. Sir T. Bosdin Leech, another Director of the Company, was unable to be present, having undertaken a voyage to the West Indies; and the Secretary (Mr. B. Haynes) likewise wrote regretting inability to attend the meeting. Letters of apology were also announced from the following, among others: Mr. Thomas Newbigging, Mr. W. J. Helps, the President of the Institution of Gas Engineers, and from Messrs. Vincent Hughes, T. H. Duxbury, and John Young, the Presidents of the Midland, North of England, and Eastern Counties Associations respectively.

Annual Report and Accounts.

The annual report of the Committee, which was taken as read, opened with the statement that the membership roll continues to increase; the number on the books being 166, compared with 157 for 1909, or an increase of nine. The Committee expressed regret to record the deaths of three members—Mr. H. Froggatt, of Bollington, Mr. John Marsland, of Sowerby Bridge, and Mr. Robert Shadbolt, of Fleetwood. They recorded that the members continued to take an active interest in the work of the Institution, and gave a list of the papers contributed to the Transactions during the past year. They also recorded that the Commercial Section branch of the Institution's work continues to justify its adoption. These introductory remarks were followed by a short account of the proceedings at the three meetings of the Institution; and the Committee concluded by stating that all the officers, Committee, and candidates for membership included in the balloting list had been elected; Mr. H. Kendrick, of Stretford, being President for the ensuing year. The accounts accompanying the report showed a sum of £67 18s. 11d. in the hands of the Treasurer, compared with £59 18s. 5d. this time last year; but the Committee reminded the members that out of the year's accounts there had been paid the 25 guineas voted at the last annual meeting to the Livesey Memorial Fund.

The President said that to the list of members who had died during the year must be added the name of Mr. Edmund Lord, of Whitworth Vale, one of the oldest members of the Institution. In fact, the name of Mr. Lord, who had passed away since the annual report was printed, stood fourth on the present roll of membership. On behalf of the members of the Institution, he had written to the widow expressing sympathy with her and the family in their bereavement.

On the motion of Mr. S. Glover (St. Helens), seconded by Mr. W. Prince (Stoke-on-Trent), the report was adopted; and on the motion of Mr. S. Meunier (Stockport), seconded by Mr. W. S. Haddock (Warrington), the accounts were passed.

Commercial Sections and the Parent Institution.

Mr. S. Meunier, in moving the adoption of the reports of the Commercial Sections, mentioned that it was intended to introduce standard clauses for the coal trade. These clauses would be so framed as to be absolutely acceptable to the colliery proprietors themselves, and allow of quotations and acceptances on the same basis. He expressed the hope that those members of the Institution who had not joined the Commercial Sections would soon do so, and give the Sections the help and benefit of their experience.

Mr. F. H. Pickles (Kildwick), in seconding the motion, remarked that a great deal of the success which had attended the work of the Commercial Sections was, in his opinion, due to the respective Chairmen; and it was a fact that they were in a much stronger position now than twelve months ago. The rating returns had been brought up to date, and in his own case recently had proved most useful to him.

Mr. W. Prince (Stoke-on-Trent) pointed out that the question of the unification of the Commercial Sections had been considered by the Council of the Institution of Gas Engineers, and the opinion was expressed that they ought to be brought into closer contact with the parent organization, with a view, he thought, of securing uniformity of working. He believed this matter was brought forward by the Southern District Association, and he was of opinion that the parent Institution would in the future take more interest in the welfare and working of the sections. It was gratifying to know that the sections were being recognized by the parent Institution; and he understood that the subject would be dealt with at the June meeting.

The Hon. Secretary said that the question of the Commercial Sections being brought into closer union with the parent Institution would form an item on the *agenda* for the June meeting of that body.

Mr. R. Watson (Doncaster) considered that this recognition of the Commercial Sections strengthened their appeal for a larger membership. If those present noted the figures, they would see that the Lancashire and Yorkshire Sections had a membership of 86, while the Manchester Institution had 166 on the books, which meant that they had only about 50 per cent. of the gas undertakings in the area covered by the Institution represented on the Commercial Sections.

The motion was carried.

Representative on the Parent Institution.

Mr. W. Whatmough was again nominated as the district member of the Council of the Institution of Gas Engineers for 1910-11, on the motion of Mr. Pickles, seconded by Mr. Barker.

Alterations of Rule.

The President next announced that the Committee had resolved—"That the members be recommended to authorize payment of railway fares to Members of Committee and Auditors when engaged on business connected with the Institution; general meetings of members excepted." He said this was done by the parent Institution; and as the Committee had a substantial amount in hand, with an income greater than their expenditure, he saw no objection to the new rule.

The proposition was agreed to *nem. con.*

There was some opposition to the Committee's further recommendation—"That the Chairmen for the time being of the Lancashire and Yorkshire Commercial Sections respectively be *ex-officio* members of the Institution Committee."

Mr. Prince moved an amendment to the effect that the recommendation be rejected.

Mr. R. Surtees (Fenton), in seconding the amendment, said he had an objection to the tail wagging the head, and expressed the opinion that it would be better if the Institution endeavoured to improve the position of members, instead of doing so much for the corporations and gas companies.

Mr. Watson said he was in favour of the suggestion, but thought the new rule should be so worded as to ensure that the Chairmen of the Sections for the time being were members of the Institution and entitled to vote.

In the short discussion which followed, it was pointed out that one must be a member of the Institution before being elected as Chairman of a Section.

On being put to the vote, the Committee's recommendation was declared carried—only four voting for the amendment.

The New President.

Mr. Morrison then said his term of office as President was a an end; but before leaving the chair he desired to thank the officers and members for the loyal support they had given him since his appointment. He had done his best to carry out the duties satisfactorily; and he trusted he left the Institution in, at any rate, as good a state as he found it when elected. It was with feelings of great pleasure that he asked Mr. Kendrick to take the chair, the more so because they as youths were in the same drawing office together at Birmingham. He hoped—indeed, he was certain—that Mr. Kendrick's year of office would be a successful one. That gentleman had been a member of the Manchester Institution for thirteen years, during five of which he was their Honorary Secretary. Mr. Kendrick had been a very hard worker, had read them papers, and done his best to further the interests of the Institution; and he (Mr. Morrison) was confident the new President would do his utmost to uphold the dignity and the prestige of the Institution over whose affairs he was called to preside.

Thanks to the Past President.

Mr. Kendrick, on taking the chair, said his first duty was to move a vote of thanks to Mr. Morrison for the way in which he had conducted the affairs of the Institution during the past twelve months. The year had been one of the most successful they had had since he became connected with the Institution thirteen years ago; and Mr. Morrison had set an example which would be difficult to follow. The energy he had shown, the arrangements he had made for the members, and his conduct of the Institution's affairs, were worthy of all praise.

Mr. S. Meunier seconded the motion, "as a member of the trio from Brum;" for he, with Mr. Morrison and Mr. Kendrick, were boys together at the Birmingham Gas-Works.

The motion was carried with applause.

Mr. Morrison, in acknowledging the vote, said he had tried to do his duty, and hoped he had fulfilled the anticipations of the members.

The President then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—I am under the deepest obligation to my fellow members of this, the premier District Association, for the honour they have conferred on me and the Company I serve in electing me to this most important position. It is not one that I have

sought—in fact, I have looked upon it as beyond my reach; there being in our Institution so many capable engineers of world-wide fame who have not occupied the chair. I am all the more grateful for the confidence of the members, and trust, with their help, to maintain the high position taken by our Institution in the councils of the gas industry, and to pass on to my successor next year the reins of office untarnished. I have a difficult task before me, and shall need all your consideration and assistance. My predecessors in the office have shown such energy in promoting the welfare of the Institution as to make it increasingly difficult to find any new subject of general interest.

The increased vitality of the Institution, under the guidance of the ex-President and our esteemed Honorary Secretary, is evidenced by the very large number of members admitted at the last meeting. As many of these are young men, with special knowledge and training denied to many of the older generation, I hope that the Institution records will be the richer in the near future, by the reading of papers on subjects which they are peculiarly fitted to expound. There are now 169 members on the books; being a net gain of eleven on the year.

DEPARTED MEMBERS.

The great reaper has been among us again, and has garnered more of our number. With painful suddenness, he took Mr. Robert Shadbolt, of Fleetwood, who had been a member for 29 years. Mr. H. Froggatt, of Bollington, and Mr. J. Marsland, of Sowerby Bridge, were also called home. The former joined the Institution in 1898, and the latter in 1897. And quite recently we have heard of the death of Mr. Edmund Lord, of the Whitworth Vale Gas Company. None of these of late have taken an active part in the Institution's affairs; but having borne the heat and burden of the day in years gone by, the work was passed on to younger men. Their loss we deplore; and our deepest sympathy goes out to those left behind, especially to our fellow member, Mr. R. G. Shadbolt.

COMMERCIAL SECTIONS.

The work done by the Commercial Sections continues to grow, and becomes increasingly useful as the possibilities are appreciated. From the informal meeting held a few years ago in Manchester, a new movement is taking place which should complete the breakdown of the old isolation of gas managers, and link them, by the exchange of ideas and information, into one whole. This should strengthen the industry in its fight with powerful rivals, who are not intrenched, as many of us are, within the ramparts of usage and cast-iron custom. Strenuous efforts are being made to wrest customers from us, without, so far, any great amount of success; but the assaults are so vigorous and so persistent that, unless we throw off our lethargy, we may awake to find that a large slice of our territory has slipped away from us. One of the subjects that is constantly recurring at our "Commercial" meetings is how may this competition be met; and on this subject, and many others of vital importance, valuable information is distributed freely by all attending the meetings. These discussions, and the weekly and other reports, must exercise a good influence on the policy of the undertakings represented by the members. As, however, the discussions are not reported, the greatest advantage is gained by the attendance of members; and as a supporter and well-wisher of the Commercial Sections, I trust that members will take a renewed interest in their work. The possibilities of the Joint Meetings are an unknown quantity. The formation of sections in all parts of the country is a most hopeful sign; and the support given to the idea of joint action on one subject leads me to hope that other matters of equal importance will be taken in hand, and that, finally, recognition will be forthcoming in the near future from the highest quarters in our industry.

THE LEEDS UNIVERSITY CHAIR.

The whole gas industry is to be congratulated upon the raising of the necessary funds for the establishment of the Chair of Gas Engineering and Fuel at the Leeds University; and great hopes are entertained of benefits to be derived from the lectures and studies carried out there, and from the researches being entered upon. Our appetites have so far only been whetted by the information made public, and we are impatient for more, and also more practical food.

CARBONIZING.

It has been truly said that all our old ideas as to carbonization are in the melting pot. It was only the other day we were informed that we were on the eve of a return to light charges and short distillations at high heats; and retorts were erected on this plan. But we had hardly grasped the meaning of this change when the reverse was forced upon our notice. The pioneer work of Mr. Bell, of Derby, and others is too recent to require further notice, as are also the vertical-retort experiments at St. Helens and Bournemouth, and by our German friends. As these systems have not yet been tried in small units in the medium-sized and small gas-works, and no information is so far to hand as to the costs of maintenance and renewals, it is necessary for all who contemplate extensions to weigh well the known advantages of the older systems before embarking on what are practically untried systems so far as the majority of gas-works are concerned. The information so lavishly given us by the inventors and promoters of the vertical-retort systems is not derived from installations that have stood the test of the ordinary working of the smaller gas-works; and the working of fairly large units continuously over long periods is no criterion of their behaviour under different conditions.

I anticipate great savings in labour expenses by the adoption of verticals in every gas-works; but the capital, wear and tear, and renewal charges are problematical, and have not been given in any communication to the Technical Press. I, of course, admit that in some cases it is impossible to give them. These remarks must not be taken as adverse criticism of the system, but rather as a statement of the direction in which further information is necessary. The yields per ton, and the illuminating and calorific values obtained, with verticals, are not unattainable with horizontals; and our friends who have been experimenting with heavy charges and eight or ten hour burning, are to be congratulated upon some splendid results. Yields of 12,000 cubic feet per ton and upwards, of good illuminating and heating value, are readily attainable; but they are for the most part only within the reach of works having an installation of power machinery.

At Stretford, we have West's "manual" machines; and the heaviest charge we have been able to put into the retorts (22 in. by 16 in. D's) is 7¾ cwt. But as much of the coal used swells considerably, it was with extreme difficulty that we were able to discharge the coke with the ordinary rake; and during our experiments we carbonized 7½ cwt. per retort. On eight-hour working over three days, we obtained as high as 12,055 cubic feet of gas per ton, of 14-candle power and 486 B.Th.U. net; the average for the seven weeks being 11,709 cubic feet of 14½-candle power and 506 B.Th.U. net. The yield from 6⅞ cwt. charges, six-hour burning, for the same coals, was 10,876 cubic feet per ton of 15½-candle power and 526 B.Th.U. net—showing a gain of 6 per cent. by working three charges instead of four in the twenty-four hours.

It would have been possible, had we been able with the means at our disposal, to have carbonized 9 cwt. or even 10 cwt. of coal per retort, when even better results would probably have been obtained. Other considerations have to be taken in account, however. During our regular working, we carbonize 27½ cwt. of coal per retort per day. But on eight-hour work, we were only able to carbonize 22½ cwt. per retort per day, which is a serious matter; and not having sufficient spare ovens, we were compelled to revert to six-hour work. This working of extra retorts meant an additional charge of 1¾d. per ton of coal carbonized (capital 1d., fuel ¼d., renewals ½d.), or £190 per annum; also £37 per annum for extra firemen, cleaners, and stackmen, and additional enrichment of one candle, costing (1 candle × 0·47d. × 380 million) £700—a total extra charge of £927. The value of the additional gas made, 435 cubic feet per ton (12,055 cubic feet, less 11,620 cubic feet present working), is 11,310,000 cubic feet at 2s. 3d. = £1272 per annum. The net saving will be £345 per annum for a gas of lower heating value—viz., 486 B.Th.U. net. As this is rather low to give the best duty for all purposes, it is probable that there would be no gain at all. We intend continuing the experiments in the spring, when, with the improved apparatus since installed, we may be able to chronicle better results. So far, we have proved that, without power machinery and heavier charges, little or no advantage can be gained by working eight-hour carbonization.

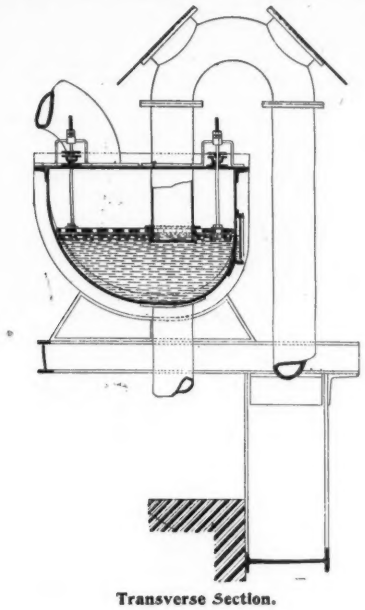
MEUNIER'S HYDRAULIC MAIN FLOATS.

One new idea lately described in the Technical Press gives us hope in this direction, and has been the means of largely increasing our make per ton without a reduction in the illuminating power or the calorific value. Mr. S. Meunier, of Stockport, has lately patented an arrangement of hydraulic main fittings that is a distinct advance on anything that has preceded it, and places within our reach the advantages of the "anti-dip" without its drawbacks. The arrangement consists of boards extending over the whole interior surface of the mains, being cut away to fit round the dip-pipes and perforated throughout with holes about 1½ inches in diameter to allow the gas a free passage to the foul main. The boards are supported by rods passing through the hydraulic main covers, and are provided with bridges, extension screws, and stuffing boxes, so that they may be fixed in any required position, which should be just on the surface of the liquor. The boards may also be used to carry extension rings to regulate the depth of the dip-pipes, where the hydraulic mains are not level, and so make an absolutely level seal attainable. In connection with the above, and for general observation, it is advisable to fix one or more sight-glasses on the side of each hydraulic main, to facilitate the levelling of the boards.

There are two sets of oscillations in the hydraulic main that must be dealt with separately and successfully if we are to reduce the pressure on the retorts to the minimum and incidentally to increase the make of gas to the maximum. There is the variation of the liquor levels due to the irregularity in the working of the exhauster, which can be met by using a retort-house governor; but by far the greatest variation is due to the violent oscillations caused by the ebullition of the gas through the liquor. These are extremely marked immediately after a newly-charged retort is closed up. It is found that the liquor washes from end to end of the main in wavelets, giving rise to variations in the levels of over 3 inches, causing the dips to be unsealed one moment and heavily oversealed the next—a process that must have a deleterious effect on the quantity and quality of the gas produced. It is a *sine quâ non* in every well regulated gas-works that the hydraulic

mains and dips should be periodically levelled to ensure an even seal. This is generally done when the retorts are cold; and it is assumed that the dips will be level also when the oven is at its working heat. We have, however, found that this is not so, and differences in level up to ½ in. and ⅝ in. have been observed on the same section after it has been put to work. The extension rings are therefore likely to be of considerable advantage in overcoming these irregularities.

Another claim by Mr. Meunier is that the fitting of the mains with his patented apparatus results in the diminution or prevention of naphthalene deposits. The prevention of the extreme oscillation of the liquor allows of the heavier tars settling in the hydraulic main, and interferes with the formation of an emulsion of the pitch with the tarry oils and vapours. These latter, not being condensed from the gas in the hydraulic main, travel forward, and, when precipitated, bring down a considerable portion of the naphthalene with them. In one works, this is brought about so effectually that no naphthalene has been found in the district for two years. At Stretford, and another gas-works where the system has been introduced, the naphthalene trouble has been very considerably reduced. We have evidence so far that Mr. Meunier's system of anti-oscillation boards in the hydraulic main will result in: (1) An improved make; (2) no loss in candle power; (3) no loss in heating value; and (4) a diminution of naphthalene stoppages.



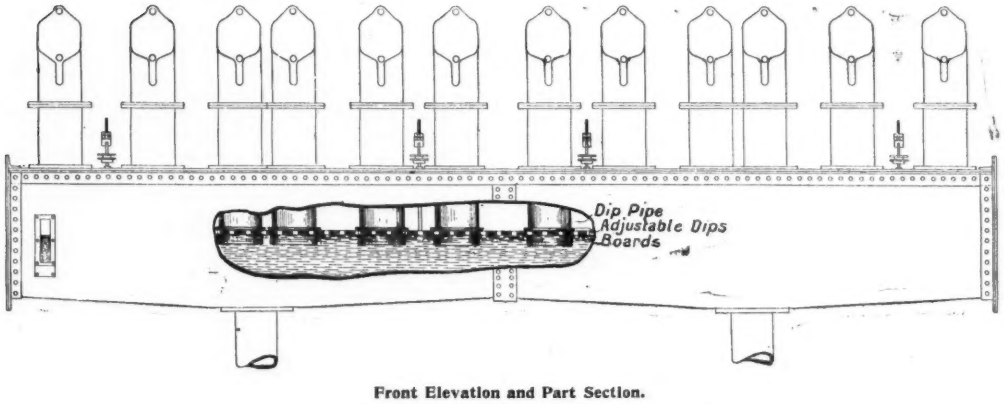
Transverse Section.

The results for the year 1909 are as follows:—

1909. Month.	Yield per Ton at 60° and 30 Inches.	Average Candle Power.	Heating Value B.Th.U. Net.	Cannel Carbonized.	C.W. Gas in Gas Supplied.	Duration of Charges.	Hydraulic Mains in Use.
	Cubic Ft.			Per Ct.	Per Ct.		
Jan.	11,096	18·02	..	1·2	23·3	6 hrs.	ordinary
Feb.	11,073	18·12	..	2·2	20·3	,,	,,
March	11,095	18·12	..	1·4	20·7	,,	,,
April	10,526	18·10	524·8	1·5	22·5	,,	,,
May	10,874	18·03	528·0	1·2	24·8	,,	,,
June	10,931	18·05	526·0	0·2	25·7	,,	,,
July	11,491	18·01	506·0	1·1	28·1	8 ,,	,,
Aug.	11,223	17·94	517·6	6·6	8·5	6 ,,	4 ordy. 8 Meunier
Sept.	11,609	18·05	516·4	3·3	14·4	,,	4 ,, 10 ,,
Oct.	11,697	18·20	513·6	1·1	22·3	,,	4 ,, 12 ,,
Nov.	11,710	18·08	521·6	1·1	23·8	,,	4 ,, 14 ,,
Dec.	11,426	18·11	521·2	0·8	19·7	,,	4 ,, 16 ,,

The test of eight-hour carbonizing commenced on June 21, and ended on Aug. 10, 1909. The lower average yield during April was due to testing bulk samples of poor slacks. Retort-house governors were put to work on Oct. 26. The poorer yield in December was due to wet coal and irregularities of the stokers. The coals carbonized consisted of—

Arley medium slack	36 per cent.
Trencherbone rough slack	32 ,,
Silkstone pea nuts and fine slack	16 ,,
Hartley and Worsley unscreened coal	16 ,,



Front Elevation and Part Section.

MEUNIER'S PATENT HYDRAULIC-MAIN FLOATS.

The main facts to be gathered from this statement are that high yields are not dependent on retort-house governors; that the illuminating and heating values are more constant and rather higher with governors than without; that the fuel carbonized is not best screened gas coal and cannel; and that Mr. Meunier's patent is undoubtedly responsible for an increased yield of at least 600 cubic feet per ton and a considerable diminution in the quantity of naphthalene in the finished gas.

NAPHTHALENE.

We have only been troubled with the naphthalene bugbear since 1906, and in 1908 the trouble was so acute (totalling 3275 stoppages in the six summer months) as to demand special measures. The use of carburetted water gas having proved ineffectual, owing to the presence of naphthalene in that gas (as much as 8 per cent. being found in the tar), various methods and solvents were tried to avoid the necessity of erecting some special plant. We sprayed solvents into the purifier outlet mains, the washer, and meter, and we tried Colson's solvent, benzol, a tar naphtha of ·9 specific gravity, petroleum, and various shale naphthas without getting satisfactory results. Petroleum and shale naphtha caused the pitch to be deposited in the washer. Finally, as the cost of a washer was too heavy, we decided to try shale naphtha of ·75 specific gravity vapourized in a small "Norwich" carburettor we had by us. So successful was the experiment that we installed a larger carburettor, and have not had any naphthalene in the district since April last, except for one short period in August and September, immediately following the last spell of hot weather, when we tried to do without solvent. The following table gives the particulars of solvent used, and the stoppages, &c.:—

Date.	Average Solvent Used Per Ton of Coal.	Average Cost of Solvent Per Ton of Coal.	C. W. Gas in Mixed Gases.	Stoppages by Naphthalene.
1908.	Gallons.	Pence.	Per Cent.	
Nov.	0·60	2⅜	22·4	133
Dec.	0·59	2⅜	23·1	268
1909.				
Jan.	0·59	2⅜	23·3	191
Feb.	0·60	2⅜	20·3	47
March	0·57	2¼	20·7	12
April	0·53	2⅛	22·5	45
May	0·51	2⅛	24·8	178
June	0·48	2	25·7	none
July	0·41	2	28·1	,,
Aug.	0·68	3	8·5	250
Sept.	0·66	3	14·4	369
Oct.	0·41	2	22·3	none
Nov.	0·34	1½	23·8	,,
Dec.				
1910.	0·30	1¼	19·7	,,
Jan.	0·28	1⅛	18·2	,,
Feb.	0·14	⅝	16·9	,,

The carburettor was attached to the gasholder inlet main as we had evidence of an accumulation of naphthalene in the gas

holder crown; the precipitated spirit, when using petroleum, giving the following percentages:—

From vapourizer	6	per cent. naphthalene.
,, gasholder inlet . . .	23	,, ,, ,,
,, inside of gasholder. .	31	,, ,, ,,
,, gasholder outlet . .	7	,, ,, ,,

As we have never obtained any quantity of oils more than 300 yards from the works, it is evident that there has not been any accumulation in the trunk mains; also, our troubles have rarely been continuous, and have always been more acute following a rise of atmospheric temperature, which, affecting the gas in the holders first, would vapourize any accumulation there, and be carried out into the district to be re-precipitated. Since we cleared the gasholders, we have only once been troubled—viz., in August and September last. Since then we have been gradually reducing the solvent used, until we are now using less than a third the quantity we were in December, 1908. I ascribe this improvement to the working of the altered hydraulic mains, although our heats are now higher, and the make considerably greater, than last year.

COALEXLD, CHARCO, &c.

The claims of the Coalite patentees have aroused in others the ambition to provide a smokeless fuel that can be more readily ignited and burnt in the open fire than ordinary gas-works coke. The purification of the atmosphere by the abolition of raw coal, and the substitution for it of gas or coke, will meet with your approval; and, as was impressed upon us by the lecturers at the Manchester Gas Exhibition in 1907, the domestic grate has much the larger share in the vitiation of the atmosphere. We as gas suppliers are doing much to reduce the harmful effect of the noxious vapours given off by coal burning by pushing the use of gas for heating and cooking; but we have still to dispose of the coke. If this can be sold within our own areas, it will be to the advantage of every undertaking. This should not be a difficult matter if the fuel is made suitable for the open grate; for, as stated by Mr. R. Watson a year ago, taking the average of the country, the proportion of coke made was slightly under one ton per consumer, which, if we were able to induce them to use, would still leave a large margin for coal and Coalite or other similar productions.

We have for the past eighteen months been trying to cultivate a market for Coalexld, but have so far not been very successful in establishing a large trade. We have a few customers who prefer this fuel; and their number is slowly increasing. We have made, by the desire of my Directors, a series of careful tests of coal carbonized with and without the Coalexld chemicals—keeping a record of the yield of gas and residuals, illuminating power, calorific values, impurities in gas and ash, and sulphur in coal and coke. The results are tabulated, and are the average of fifteen separate tests in each case.

TABLE I.—*Gas and Residuals.*

—	Gas per Ton.	Illuminating Power.	Multiple Gas × c.p.	Tar per Ton.	Liquor 5° T. per Ton.	Coke per Ton.
	Cub. Ft.	Candles.	$\frac{1000}{\text{C'ndle Ft.}}$	Gallons.	Gallons.	Cwts.
Without chemicals .	11,192	18·62	208·4	11	19 4	13·57
With ,, .	11,614	18·24	211·8	11	18·8	13·57

TABLE II.—*Impurities and Constituents of Clean Gas.*

—	Crude Gas.			Purified Gas.			
	H_2S.	CO_2.	NH_3.	CO_2.	O_2.	CO.	S.
	Per Ct.	Per Ct.	Grains.	Per Ct.	Per Ct.	Per Ct.	Grains.
Without chemicals .	1·19	1·44	70·6	1 39	0·16	7·87	34 28
With ,, .	1·01	1·60	69·8	1·57	0·13	7·93	28·86

TABLE III.—*Ash and Sulphur in Coal, Coke, &c.*

—	Ash in Coal.	Ash in Coke.	Total Sulphur in Coal.	Volatile Sulphur in Coal.	Sulphur in Coke.	Sulphur in 5° T. Liquor.
	Per Ct.	Per Ct.	Per Ct.	Per Ct.	Per Ct.	Per Ct.
Without chemicals .	3·59	7·31	1·769	0·566	1·203	0 388
With ,, .	3·59	7·48	1·810	0·554	1·256	0 381

TABLE IV.—*Heating Values Coal, Coke, and Gas.*

—	Gas B.Th.U.		Coal.		Coke.	
	Gross.	Net.	Calories.	B.Th.U.	Calories.	B.Th.U.
Without chemicals .	609·7	524·4	7373	13,272	3753	6706
With ,, .	602·3	528·2	7373	13,272	4113	7405

These tests were undertaken to ascertain what effect the process had upon the gas and residuals. The result is purely a negative one, except the diminution of the sulphur in the gas. There was a slight increase in the ash, as would be expected from the addition of chemicals to the coal. The claim of less sulphurous fumes when the fuel is being burnt, I am able to confirm to a limited extent; and also that the Coalexld, when broken for domestic use, does ignite and burn more readily than ordinary coke.

The later rival of Coalite, "Charco," requires no chemicals; being merely coke cooled out of contact with air and water. The patentee suggests smothering the red-hot coke with small breeze. This is a costly process; and if a demand should arise for the fuel, I should suggest cooling in air-tight chambers. This method of cooling is really an annealing process; the ordinary rapid quenching with water increasing the natural hardness of the coke, and more or less saturating it with water. "Charco" is in its appearance denser than coke—more like charcoal, and tough, and absolutely free from moisture; so that when burnt in an ordinary grate it does not spurt or crackle. It burns easier, and ignites more readily than even Coalexld, and in a very short time gives a bright glowing and hot fire. I have not yet investigated the other claims of less sulphur, &c. The cost of these two processes is about the same; the additional labour on "Charco" counterbalancing the cost of the chemicals for Coalexld. Either of these processes is worth trying, and has resulted in increased sales and profits at many gas-works. In our case, we have such a good sale for the ordinary coke that we have not attempted to push the sale of Coalexld yet; but the production of a coke that could all be sold within his own area would be an inestimable boon to many gas managers.

FIRE-CLAY GOODS.

The recent "German" scare has interest for us all, if only that the opinions of the Directors and Managers of the South Metropolitan Gas Company are worthy of attention. It is distinctly hurtful to our national pride to be told that our fire-clay goods makers do not set themselves out to make the best possible articles from the materials at their disposal. This attack, following on the valuable paper read by Mr. F. J. Bywater in 1908, should cause all the manufacturers to be certain that their methods are up to date, and that the goods they produce are equal to the changed conditions of present-day retort-house practice. All will agree with me that the materials supplied by the same firms often show alarming variations in quality. The reply by some of the makers, that they produce what they are paid for, was hardly courteous. At the same time it has a very considerable amount of truth in it; and no doubt you all could name towns where the lowest tender, irrespective of quality, is always accepted. This is an expensive way of doing business; and if the cost of renewals of retorts at various works were separated and compared, I am firmly of opinion that the lowest in cost would be those that paid the most for their fire-clay goods. From personal knowledge, I can affirm that there are firms to-day who are making a speciality of goods for certain purposes that are a vast improvement on only a few years ago. But we have not reached finality yet; and there is plenty of room for improvement. If it is only the cost that is in the way, let the makers show that the value is there, and no gas committee or board would be so shortsighted as to refuse to pay an increased price for a superior article.

CARBURETTED WATER GAS AND ENRICHMENT COSTS.

As our larger neighbours certify the gas they send out to be from 17½ to 19 candle power, my Board feel compelled at present to supply gas two candles over the parliamentary standard—viz., 18 candle power tested at the works by the No. 2 "Metropolitan" burner. It is necessary therefore for the straight coal gas to be enriched by 2½ candles. A series of tests with several enrichers gave the following costs.

Enricher.	Cost of Enriching by 2½ Candles. Pence.	Cost per Candle. Pence.
Carburetted water gas	1·18 ..	0·47
Benzol	1·61 ..	0·64
Cannel	1·82 ..	0·73

Benzol has been given a far higher enrichment value than here found. It, however, does not carry over the long distances we have to distribute our gas; and instead of an enrichment value of 28,000 candle-feet per gallon, we are unable to satisfy ourselves that more than 13,000 candle-feet reached our consumers during the winter months, at a distance of over 4 miles from the works. We prefer to use the more stable cannel gas instead of benzol if the carburetted water gas plant is out of action, and only turn to benzol if unavoidable.

The reason for this loss is due to the presence of other hydrocarbon vapours in coal and carburetted water gas, which, when over-saturated with benzol vapours, mutually precipitate each other. This is confirmed by the report of the Committee on Benzol Enrichment presented at the annual meeting of the American Gas Institute in October last,* which points out in addition, that, if benzol enrichment is to be successful, means should be taken to remove a portion of the low-tension hydrocarbon vapours from the gas. Blue water gas will take up and carry large quantities of benzol vapour; and a straight coal gas can be saturated more completely than carburetted water gas, or a mixture of the two, as the percentage of heavy hydrocarbons in the latter is at least double that in the former. This is one reason for our continuing to manufacture carburetted water gas. Others

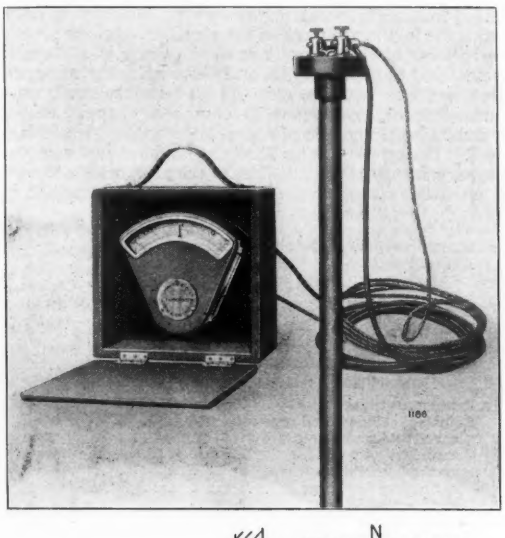
* See *ante*, p. 239.

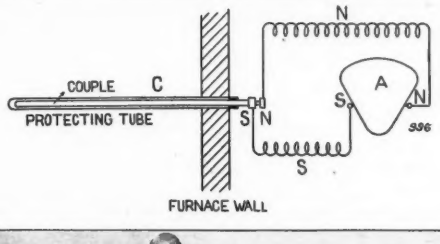
are: The ease with which the make can be increased if necessity arises; control of local coke market; less labour troubles, and better class of men; less space needed for plant and materials.

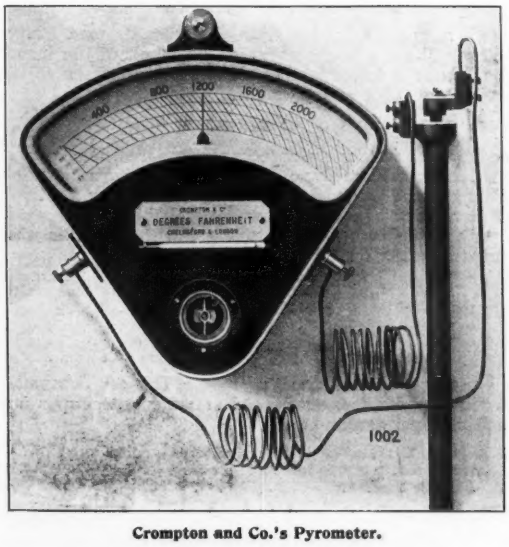
These are collateral advantages that can only be appreciated completely by those placed in similar positions to our own, where they are dominated to a large extent by the prices and stocks of coke at neighbouring large undertakings. There are many undertakings where carburetted water-gas plant would not pay; but because it does not pay there, it should not be assumed that it does not pay anywhere else. I am quite sure that my Directors will support me when I emphatically state that the installation of the carburetted water-gas plant at Stretford has materially helped to cheapen the price of gas to the consumers.

PYROMETERS FOR OIL GAS.

We have at Stretford been using, to control the heat of the fixing-chamber of our carburetted water-gas plant, a pyrometer of simple make and small cost, made by Messrs. Crompton and Co., Limited. It consists of a nickel rod placed inside a steel tube without touching it. At one end the two materials are welded together; at the other end, terminal clamps for the connecting leads are brazed to the rod and tube. The leads are of nickel and steel wire, and are connected to the terminal clamps and to the indicator as shown in the illustration.







Crompton and Co.'s Pyrometer.

The indicator is constructed on the principle of a dead-beat galvanometer, and has a direct-reading scale constructed to take into account variations in the temperature of the indicator; these variations being measured by a small thermometer attached to the face of the instrument. The gas makers are able by its use to maintain temperatures in the fixing-chamber that ordinarily will not vary 10° Fahr. throughout the day. The instrument was installed on Jan. 6, 1906, with results that can be appreciated from the following extracts from our illuminating power book.

	Average Monthly. Candles.	Highest. Candles.	Lowest. Candles.
Nov., 1905	18·80	20·43	17·80
Dec., 1905	18·46	20·90	15·00
Jan., 1906	19·16	21·35	18·21
Feb., 1906	19·66	21·67	18·12

I estimate the saving on oil alone has been at least £110 per annum. The half-yearly figures from 1904 are as follows:—

Half Years Ended	Candles. Average.	Highest.	Lowest.	Difference.	Candles per Gallon.	Source of Oil.
June, 1904	19·98	22·24	16·00	6·24	7·01	America
Dec., ,,	19·23	21·38	16·07	5·31	7·17	,,
June, 1905	20·86	22·77	18·47	4·30	7·24	,,
Dec., ,,	19·39	22·20	15·0	7·20	6·74	,, and Texas
June, 1906	19·21	22·95	15·12	7·83	6·69	,, and Samples
Dec., ,,	21·26	22·77	19·37	3·40	8·21	Russia
June, 1907	21·58	23·22	19·71	3·61	7·54	,,
Dec., ,,	20·51	22·00	18·53	3·47	7·17	Kansas
June, 1908	19·47	22·56	18·00	2·56	7·22	,,
Dec., ,,	20·13	21·51	19·04	2·47	7·38	America
June, 1909	20·75	21·87	19·81	3·06	7·40	,,
Dec., ,,	20·72	22·09	19·36	2·73	7·35	,,

This shows a decided improvement in the working since 1906. Many of the differences are due to defects in the oil injectors, as the usual working is very regular.

Since installing the pyrometer, we have made working tests of different gas oils, and have at our command data of considerable value, which enable us to judge the value of a gas oil when we know the price. All the oils we have tried have a different cracking temperature; and in many cases a rise of 10° or 20° in the fixing-chamber will cause a considerable drop in the candle power. The following are some of the results obtained:—

Oil.	Candles per Gallon per 1000 Cubic Feet at ° Fahr. 1250.	1260.	1270.	1280.	1290.	1300.	1310.
North American I.	7·67	7·81	8·13	8·10	7·85	7·76	7·63
,, ,, II.	—	7·53	7·54	7·90	7·39	7·24	—
,, ,, III.	—	—	—	7·20	7·31	7·28	7·14
Russian	—	7·72	7·74	7·81	8·12	—	7·81
Roumanian	7·20	7·23	7·25	7·31	7·44	7·29	7·14
Scotch I.	8·24	7·94	7·88	7·80	7·63	7·86	7·76
,, II.	7·47	7·60	7·95	7·93	7·85	—	7·40
,, III.	7·59	7·67	7·89	7·95	—	7·54	7·30

It will be seen that while some oils allow a fairly large range of temperature for working, others permit only a small one. The reason for this can be explained only when fractional distillation of the oil is made, from which it will be seen that, when the boiling points of the fractions have a wide range, there is less margin in the cracking temperatures for the best results to be obtained, and *vice versâ*. As the American oils are now a mixture from different oil-fields, and as the percentage from each varies at different distilleries, so the best cracking temperature will vary also. The main difficulty with Scotch oils has been the trouble in obtaining consecutive deliveries of anything like constant specific gravity. Our tests prove that with a pyrometer more uniformly better results can be obtained, and the best cracking temperature readily ascertained and maintained without difficulty.

COAL TESTING.

Several methods of computing the value of coals have been given, which appear to be very complicated. The method adopted at Stretford is much simpler, and arrives at the value of a coal as near as is necessary. We do not take a standard coal, but work out all offers to the cost of the gas, as follows:—

Result of typical test:

Gas per ton	10,876 cubic feet.
Candle power	16·21 candles.
Yield of 17-candle power gas per ton	10,371 cubic feet
Coke, dry	13·09 cwt.
Ammoniacal liquor, 10-oz.	22·46 gallons.
Tar	11·62 ,,
Ash in coal	7·34 per cent.

Valuation.

Cost of coal delivered	9s. 6d. per ton.
Discharging	4 ,, ,,
Carbonizing wages	2 3 ,, ,,
Extra clinkering for ash ¼d. for 1 per cent.	2 ,, ,,
Total	12s. 3d. ,, ,,

Deduct—Residuals:

Coke, 13 09 (less fuel 15 per cent. + twice the ash = 3·89) = 9·20 cwt. at 7d.	= 5s. 4·4d.	
Tar, 11·62 gallons at 1¾d.	= 1 2·5	
Liquor, 22·46 ,, ,, ⅝d.	= 1 2·0	
		7 8·9
Net cost of gas		4s. 6·1d.

$\frac{4s.\ 6{\cdot}1d.}{10{,}371}$ = 5·23d. per 1000 cubic feet of 17-candle power.

PURIFYING.

In 1906, I gave the members some particulars of our trials of hurdle grids in the purifiers. I am now able to supplement this by a complete record for four years' working. As the figures speak for themselves, I give them without further comment.

Year.	Purifiers in Use with Hurdle Grids.	Purifiers Changed in the Year.	Coal Gas Made Million Cubic Feet.	Coal Gas Purified per Change Million Cubic Feet	Labour Costs per 1000 Cubic Feet of Gas Made.
					d.
1904 . . .	none	76	258	3·4	0·23
1905 . . .	1 for 3 months	80	266	3·3	0·22
1906 . . .	1 ,, 4 ,, 2 ,, 5 ,, 4 ,, 3 ,,	67	262	3·9	0·18
1907 . . .	4	49	275	5·6	0·13
1908 . . .	4	41	288	7·02	0·14
1909 . . .	8	30	291	9·7	0·095

We have eight purifiers 20 feet square, which hampers us considerably. Had we larger boxes, the labour costs should be much below these, as the rate of flow of the gas through the purifiers during the winter is too high for the most efficient work, as shown by the following table:—

Months.	Gas Made. Cubic Feet.	Number of Changes.	Cubic Feet per Minute.	Rate of Flow. Feet per Minute.
May to August . .	71,023,000	4	401	0·50
November to January	103,977,000	13	785	0·98
Maximum day . .	1,450,000	—	1007	1·26

As it is our practice to put into use during November of each year a considerable quantity of new oxide, these figures are unfavourable to the summer working. The oxide used is entirely artificial, which, revivifying readily with little labour, reduces the costs considerably when compared with other material in the market. The average of the figures given by O'Connor for the size of purifier required by us is 512 square feet each for the maximum make, or 29 per cent. more than we are working with. So that for purifiers fitted with the new vertical hurdle grids, the old figure of 0·6 square foot per 1000 cubic feet of gas made is much in excess of actual requirements, but if worked to will certainly reduce the labour costs, although, at the same time, it will increase the capital charges.

DISTRIBUTION AND GAS SUPPLY.

The time has gone by for the distribution department to be merely concerned with distributing the gas; and it now adds to its originally numerous duties lighting, heating, and power in all its various forms. The day when the gas-works jurisdiction was assumed to end at the meter has gone, never to return; and many now exercise control up to the point of consumption. There are, however, still too many who keep to the old usages, and whose committees or boards effectually check any expansion for fear of interfering with a trade and robbing a ratepayer of work he never had, and cannot, in the majority of cases, carry out if he had it. To-day the gas undertakings which are most successful in retaining custom are those that are the most aggressive; and it is more than ever necessary to show a willingness to serve our consumers at all reasonable cost rather than discourage them, as was often the case in years gone by. Generally speaking, the plumbers who have had a monopoly of the gas-fitting business in any area for years are the worst enemies of the gas undertaking. They are trained to sanitary and general plumbing only; and as plumbing work includes pipe work, the business has drifted into their hands. Every manager is called upon to investigate complaints from only comparatively old property, and knows to his cost what ideas this body of men have had in the past; and many districts have to be served with pressures far in excess of their needs because of the small pipes installed before the day of gas-fitters regulations.

I should like to see our Institution and the Institution of Gas Engineers endeavour to impress the Master Plumbers' Association with a sense of the gravity of the situation. There is not the slightest doubt that we lose a far larger number of consumers to our rivals than we should had these tradesmen understood even a little about the apparatus they are so often called upon to fix and maintain; and proof has been given through the Public Press, where addresses have been known, that many of the awful examples given by our electrical friends, of saving when electricity has displaced gas, can be generally traced to ignorance of the apparatus used either by the consumer himself or by his plumber and gas-fitter. The prevailing method of authorizing plumbers as gas-fitters is to be deplored. An applicant is generally asked where he served his time, if he has tools and a workshop, and the inquiry then ends in a certificate being granted. This represents a considerable asset to the man; but because of the very insufficiency of the tests, it is actually, in many cases, a cause of trouble and loss to the gas department. I am aware there are notable exceptions to the rule; but they are as oases in a desert, and deserve every encouragement at our hands.

I should like to see established in every large centre technical classes dealing with gas supply in a practical form—not such as are now working under the City and Guilds of London Institute, which, with the examinations held, are essentially for the chiefs and assistants of the distributing department, but classes dealing with such problems as are met with by the ordinary workman in his daily routine, to which could be added a practical course in gas-fitting, construction, and regulation of burners, fires, cookers, &c. If this suggestion meets with favour, and the powers that be can be roused to its importance, we should be able to revolutionize the gas-fitting business to our and the public's benefit.

Many gas companies—and notably the London Companies—are themselves doing pioneer work on these lines, with great benefit to themselves in the fight with electricity; and it will pay all but the small undertakings to follow their example. Men so trained will be a valuable asset to any undertaking; and whether they remain in the gas-works employ or commence in business for themselves, it will be equally advantageous to the gas department. The "Illuminating Engineer," in a recent issue, refers to this question in the following words: "The policy of reducing prices, and at the same time giving prompt and business-like attention to every requirement of their consumers . . . has already proved itself to be sound, and is destined to bear even greater fruit in the future."

The Stretford Gas Company commenced four years ago with five men on maintenance, meter-fixing, and cooker-repairs; to-day they employ eleven—all trained on the works. The work entrusted to them is increasing every year, but they do not interfere with the legitimate work of the plumber, such as pipe-laying and carcassing of buildings; their work (which is all brought to us) is confined to maintenance, and cleaning, fixing, and renewing burners, gas-fires, cookers, &c. As an advertisement, we clean the incandescent gas-burners in churches, chapels, clubs, and other public buildings free of charge; the authorities finding the mantles. Taking pattern by Sheffield, we have just completed a preliminary survey of the gas-fires in the area, with a view to the adoption of free cleaning; the result is instructive, and the figures will provide food for serious reflection.

Houses visited		256
Not admitted		13
	Gas-Fires.	Cookers, &c.
Apparatus inspected	442	133
Found in good order	72	56
,, defective	370	77

ANALYSIS OF DEFECTS.

Gas-Fires.

Passing too much gas	5
Adjusted, cleaned, and renewed fuel	15
Cleaned and renewed fuel	237
Cleaned only	66
Repacked and renewed fuel	38
Short of fuel	7
Defective nipples	4
Improperly fixed	3
Defective firebrick backs	6
Defective flues	25

Cookers.

Defective pipes	9
,, taps	29
,, bars	13
,, and choked burners	52
,, grillers	36
Dirty ovens	8

Other Defects Noted.

Defective gas-irons	3
,, supply to house	18

This is a truly deplorable state of affairs, and one I hope my Directors will not allow to recur. One result of the inspection will be, I hope, a determined effort before next season to largely increase the number of fires in use.

COOKERS.

We have not seen our way to fix cookers free, but believe that it would add considerably to our expenses did we adopt the plan. An estimate made a short time ago, after allowing for the gross profit on the extra gas sold, showed a probable loss amounting to 1½d. per 1000 cubic feet on the total gas sent out. Our statistics relating to cookers for the past four years are:

	Cookers on Hire.	Rental.	Repairs and Maintenance.
1906	1164	£644	£423
1907	1151	600	592
1908	1335	484	443
1909	1463	562	461

The hire-rates were reduced in 1907. The gas consumed per cooker in our area does not exceed 11,000 cubic feet per annum; the net profit per annum being:

Gas.—1463 × 11,000 cubic feet = 16,093,000 cubic feet at 10d. per 1000 cubic feet profit =		£670
Add rentals		562
		£1232
Deduct.—Interest on cost, 6 per cent. on £6584 =	£395	
Repairs, cleaning, refixing, &c.	461	
		856
Net profit, or 5·7 per cent. on the outlay.		£376

The figure of 10d. per 1000 cubic feet includes gross profit 6½d., and 3½d. saving on working expenses, as there will be no extra

charge for distribution, management, clerks, inspection, and collection.

From these figures, it will be seen that all we could do to balance the items would be to reduce our hiring-rates by half. If they were abolished altogether, there would be a loss of £200 per annum on the present cookers, which would be greatly increased, and the average consumption reduced by the fixing of large numbers of cookers in houses where the main reason for having them would be that they were free.

GRILLERS.

Instead of fixing free cookers, we have fixed free grillers; the expense being less than one-fourth that for cookers, while the gas consumed is nearly half, and the profit one-and-a-half times as much. The griller we generally fix is 12 in. by 9 in. by 7 in. inside, provided with base and door, grill burner with deflecting grill plates, and separate boiling burner on top. A separate $\frac{3}{8}$-inch gas supply is laid from the nearest $\frac{1}{2}$-inch pipe in the house. The total cost for the 4813 now in use is £3991, or 16s. 7d. per house. What they have done for our consumption can be seen from our slot-meter statistics.

Year.	Total Gas Consumption.	Slot Meters Fixed.	Average Consumption per Meter.	Grillers Fixed with Slot Meters.	Total Grillers Fixed.
	Cubic Feet.		Cubic Feet.		
1905 . .	12,104,200	1501	8,421	..	..
1906 . .	14,759,800	1732	9,133	1021	2693
1907 . .	21,206,800	2156	10,426	1306	3029
1908 . .	25,684,100	2494	10,656	1495	3820
1909 . .	30,320,900	2762	11,323	1873	4813

This shows an increase of 2902 cubic feet per consumer in four years, and a consumption of $\frac{2902 \times 2762}{1873} = 4334$ cubic feet per griller per annum.

The net profit per annum is—

Gas.—4334 cubic feet × 4525 (average grillers in use) = 19,611,000 cubic feet, at 10d. profit . . . . =		£817
Deduct.—Interest on cost, 6 per cent. on £3991 . =	£241	
Repairs, renewals, cleaning, and refixing . . .	216	
		457
Net profit		£360

equals 9·05 per cent. on the outlay, or one-and-a-half times the return on cookers, even with the hiring-rate added.

STREET LIGHTING.

Patient, plodding work always tells in the end; and the inventors of street-lamp controlling devices can congratulate themselves that their probationary period has passed, and the days of the man with the torch are numbered. The use of controllers is extending rapidly; but the number of new devices is legion, and adds to the difficulty of the seeker after the best apparatus. We have had trials of both pressure and clockwork arrangements. Personally, I prefer the pressure type, for the following reasons: They are certain in their action; more simultaneous in lighting up; not so liable to be lighted up by vibration; less working parts to get out of order; repairs and cleaning at a minimum; first cost usually less; action not dependent on attendant; can light up at any time without sending round the lamplighter.

The only troubles we have had with the pressure controllers (not due to naphthalene) has been the corroding of the exposed parts (since done away with by the protecting of the working parts from atmospheric influences) and occasional variations of the district pressure at or near the critical point, which has twice resulted in the lamps being extinguished in the middle of the evening, and nine times extinguishing them by the pressure rising late at night (owing to the consumption falling) and subsequent relighting again when the pressure was raised for extinguishing. All but one of the latter occurred during the first few months of working. The cost per annum of the same lamps with and without controllers has been:—

Without controllers—Gas	13 9
Maintenance	3 10
Wages, repairs, painting, &c. . .	16 4
	£1 13 11
With controllers—Gas	14 4
Maintenance	5 7
Wages, repairs, painting, &c. . . .	8 8
	£1 8 7

This shows a saving of 5s. 4d. per lamp, or £63 14s. per annum on the 237 fitted. The inclusive cost of fixing was £242 2s. 8d. The saving shown will, therefore, have covered the outlay by 1911; the work having been carried out in July, 1907. The saving shown would have been greater had we not been compelled to dispense with the anti-vibration frames, owing to the lanterns being small; the mantles used having increased by more than 100 per cent.

A record of the mantles employed, and also under various different circumstances, is interesting.

Type of Lantern and How Secured to Column.	Anti-Vibrator Used.	Size of Lantern.	Mantles per Annum.	Means of Lighting.	Remarks.
		Inches.			
Wind proof, fixed by frog	Frame	16	4·4	Flash torch	Average of district
Do.	None	16	9·3	Controller and bye-pass	,,
Do.	None	16	10·1	Flash torch	,,
Good ordinary, not wind proof, fixed by frog	Frame	17	12·8	Torch with hood	Subject to heavy traffic, main road
Do.	Spring and weight	17	20·2	,,	,,
Cheap ordinary drop doors, loose in head frame	None	14	39·7	,,	Ordinary traffic in by street
Do. do. fastened in head frame	None	14	18·0	,,	,,

ILLUMINATION AND ILLUMINATING EFFECT.

The formation of the "Illuminating Engineering Society" should be a matter for congratulation; and though some of the questions discussed may be abstruse, yet many of the articles printed in the "Illuminating Engineer" have a direct bearing on our profession, and we should at least keep in touch with them. At present, the Society consists largely of members of the electrical professions; gas being represented by only five members of the Institution of Gas Engineers. Consequently, most of the articles appearing have dealt with electrical matters. As a mixed Society, it should be neutral ground, where all will receive fair and equitable treatment. That neither gas nor electricity receives it from the other cannot be denied, and statements and claims are continually being made that depend on experiments carried out under perfect conditions in ideal laboratories, and which cannot under ordinary circumstances be attained. When tests are made for public consumption that are founded on results obtained by a process of rejection until the highest or lowest possible readings are reached, can it be surprising that such alarming discrepancies occur between the figures relied on by competing authorities? We have one redeeming feature on our side; in our comparisons, we do take the latest electric lamp, but our friends and opponents still cling to the out-of-date flat-flame gas-burner.

We gas engineers are slowly shaking off the old shackles; and the sharpening of our weapons in the arena of such societies as the Illuminating Engineering Society should be to the benefit of all, and assist us to break through obsolete and, if necessary, modern rules as well. In a recent issue of the "Illuminating Engineer" occurs the following remarks by the Secretary of the Michigan Gas Association and Mr. P. J. Thompson, of the Pacific Coast Gas Association. The former, after referring to a good bridge-player as winning games when he knows how to break rules, says: "In illuminating engineering, it is the ability to know when to break rules that secures business;" and the latter defines an illuminating engineer as: "A gas engineer with common sense." This is very tersely put with true American bluntness; but it is so true that we cannot afford to ignore the mines of information contained in any technical lighting journal, whether written by gas engineers or not. Unless we keep abreast of the times, and do something more than point out how much cheaper and healthier gas lighting is than its rivals, we may be left behind in the race. The electricians are fitting the light to suit the circumstances, and we must do more than merely flood rooms with (sometimes) superfluous light.

A comparison of illuminating powers of burners with different globes and shades, with a table of reflected light from different decorations, would be useful information for our inspectors to have; and a series of experiments to determine the exact effect would increase our chances with our rivals and answer many queries as to poor illuminating effect. Some rough tests made in our photometer room gave the following figures:—

Globes, &c., Used.	Best Type of "C" Burner.			Cheap "C" Burner.		
	Gross Candle Power.	Gas Used per Hour Cub. Ft.	Candle Power per Cub. Ft.	Gross Candle Power.	Gas Used per Hour Cub. Ft.	Candle Power per Cub. Ft.
No chimney or globe .	69·27	3·46	20·02	44·71	3·28	13·71
Straight chimney . . .	74·21	,,	21·44	48·17	3·15	15·33
Straight chimney and metal reflector . . .	88·00	,,	25·42	57·74	,,	18·36
Clear domestic chimney.	71·44	3·55	20·12	37·17	2·95	12·59
Clear domestic chimney and opal reflector . .	92·12	,,	25·95	50·49	3·12	16·13
Opaline chimney . . .	61·29	,,	17·26	38·87	,,	12·44
Opal globe	34·81	,,	9·81	26·73	,,	8·52
Pale ruby globe frosted .	36·56	3·45	10·59	26·31	3·14	8·39
,, ,, ,, cut . .	45·83	,,	13·28	32·46	,,	10·34
,, green globe frosted	44·11	,,	12·78	33·22	,,	10·56
,, yellow ,, ,,	51·93	,,	15·05	36·48	,,	11·58

The amount of reflection from walls assisting the illumination of a room varies considerably as they are light or dark, glazed or

matt surface, and in conjunction with tinted globes, which are so greatly in fashion now, detract largely from the quantity of light available. The following will give some idea of the results to be obtained. The burner used was the best type of "C" burner, with a straight, clear chimney. The various papers were placed on a screen behind the test-burner and arranged to reflect the light on to the disc in the first series. In the other, the burner was placed at one side, and only light reflected from the surface of the paper was measured.

Description of Wall Paper.	Light Reflected through Mantle.			Reflected Light Only.		
	Candle Power.	Gas Used per Hour Cub. Ft.	Candle Power per Cub. Ft.	Candle Power.	Gas Used per Hour Cub. Ft.	Candle Power per Cub. Ft.
Chimney only, ordinary background	74·06	3·45	21·46	..	3·45	..
Cream glazed	81·59	,,	23·65	8·16	,,	2·36
Medium blue, glazed	73·30	,,	21·24	not measurable		
Light buff, smooth	77·31	,,	22·41	5·91	,,	1·71
Light brown matt	74·83	,,	21·68	4·38	,,	1·27
Medium art green, smooth	73·15	,,	21·20	3·99	,,	1·16
Deep red matt	71·10	,,	20·61	not measurable		
Medium red, smooth	73·14	,,	21·19	2·65	,,	0·77
Light red, glazed	75·08	,,	21·76	3·36	,,	0·97
Medium brown, glazed	73·45	,,	21·29	3·02	,,	0·87

From these figures it will be observed that cream, buff, and light brown papers assist the illumination by reflection, but that blue, red, and green papers detract from the light by absorption. The matt surfaces is much worse than smooth or glazed.

GAS EMPLOYEES "VADE MECUM."

In comparing lights and meeting consumers' complaints of poor illumination, the effect of colour and reflection is too often overlooked; and if we possessed someone with sufficient enterprise to write a small volume for gas employees (embodying similar information to the foregoing) on all uses of gas, corresponding to one entitled "Electricity for Everybody," he would do the industry good service. This book is divided into sections dealing with lighting, heating, power, engineering, canvassing, &c., and under each heading is put in a clear and concise form information to enable the chief or his subordinate to quickly deal with practically all the questions he will meet with in the daily routine. Under the head of "Canvassing" are some suggestions that we should do well to study. But I hope that any writer taking my suggestion would be fairer to electricity than the compiler of this book is towards gas; for, however good the other sections are, this one is full of "terminological inexactitudes." Writers on gas subjects should be careful to see that their statements cannot be used against them; for in this book there is as fine a collection of "facts" about gas-cookers as one would wish to see—many of them culled from makers' catalogues and cookery books issued through makers, and here used against us under circumstances that render correction almost impossible. I have myself seen in makers' advertisements statements that definitely assert that all others goods are faulty. These may be good business methods; but they are questionable tactics.

GAS-FIRES.

We are still looking for a really efficient and flexible gas-fire that will rival solid fuel in cheapness and be equal to meeting all the vagaries of the English climate. The fires supplied by most of the makers are not sufficiently flexible for every-day use, and cannot easily be adapted by the ordinary householder to meet the changes of temperature to which we are subject. It is no use telling the lady of the house or the maids that, when they wish to adapt the fire to the needs of the moment, they must alter the adjuster. This work requires a certain amount of skill, which is rarely to be found even among the men of the household; they would either use the tap or ask you to remove the fire. Regulation by the tap is wasteful, and will nullify any advantage obtainable by the use of gas and air adjusters. In the fires we have tested, the effect of this, with one exception, is to reduce the efficiency out of all proportion to the lessened consumption. To obtain every advantage, all gas-fires should be fitted with duplex or even triple burners, according to their size, and with burners also that, within certain limits, retain their efficiency and give a flame of such a shape as will ensure the fuel radiating heat waves into the apartment proportionally to the consumption. The additional cost of fires so fitted will no doubt be an objection at first; but so was the price of the incandescent gas-burner when first introduced. Only a few years ago, it was difficult to persuade a consumer to spend a penny on a new flat-flame burner; now they will spend shillings on incandescents. So it would be with gas-fires. The consumer would soon realize their economy, and in the end gas-works and manufacturers would benefit.

The single row fuel fires are not all they were represented to be. The efficiency and the duty have been enormously improved; but the fires now supplied do not generally give the same heating effect, size for size, as the old fire with deep back. The rush to reduce consumptions was pushed to the extreme; and no doubt other gas undertakings beside ourselves had to fix old pattern fires to meet the complaints of want of heating capacity. Matters were better in 1909; but there is still room for improvement.

The size of room a given fire will heat is often stated in makers' catalogues. We have proved these figures to be unreliable. They need to be corrected in many ways; and we have repeatedly failed to obtain similar results. Most of the testing-rooms are specially constructed for the purpose, some with double doors and windows; and even where this is not so, they rarely approach the ordinary conditions of a living room. Either the window spaces are not proportionate, the doors all open out into other rooms, outside walls are shielded from cold winds, draughts and cold air are rigidly excluded, and altogether artificial conditions are set up, which vitiate all results obtained, except for comparisons. I grant it would be more difficult to obtain comparative results unless more than ordinary precautions are taken; but in certain cases these laboratory results are given to the world as those which may be expected in practice.

The latest improvements in the fuels and burners fitted to gas-fires are self-contradictory. The Venturi tube burner gives a short, hot flame, wide at the base, that can be heavily supplied with air; while the pillar fuel requires a long flame, which can only be produced by a restriction of the air supply, and, consequently, a less intense flame. If the Venturi burner becomes general, there will most likely be a return to the 6-inch fuel of two years ago. Our consumers naturally object to a fire that roars; but a roaring flame gives the better duty. We have carried out a few tests in order to decide which fires we could recommend to our consumers; but, unfortunately, the most efficient are difficult to sell when in competition, as they are encased in what has been termed a poor "envelope." The tests were made with the fires adjusted to give the best flame—as a consumer would arrange them—not finding the best conditions and tabling these results. The following is a selection:—

Gas-Fires.

—	Silent Flame. Full Consumption.			Roaring Flame.		Silent Flame. Reduced Consumption.		Fuel Used.	Type of Fire.
	Gas Used per Hour.	Galvanometer Reading.		Gas Used per Hour.	Galvanometer Reading at 3 Feet.	Gas Used per Hour.	Galvanometer Reading at 3 Feet.		
		3 ft. from Fire.	With Wilson Reflector.						
	Cubic Feet.	°	°	Cubic Feet.	°	Cubic Feet.	°		
A	25	24·2	34·8	25	28·5	18	20·3	6-inch	Adjustable
B	27·5	32·9	35·6	9	10·0	21·3	23·7	Pillar	,,
C	24·7	30·5	38·2	10·7	11·6	19·3	19·8	,,	,,
D	25·5	26·0	33·2	14	15·8	14	15·4	,,	,,
E	24	21·2	..	..	..	20	11·6	Short	Not adjustable
AA duplex full	28·5	28·6	..	20	18·8	16	16·3	6-inch	Adjustable
AA duplex half	16·9	19·8	..	12	14·5	9·4	12·4	,,	,,

Gas-Fire Fuels.

Fuel from Fire.	Fire "A," Consumption 25 Cubic Feet per Hour.	Fire "B," Consumption 24·7 Cubic Feet per Hour.	Fire "C," Consumption 24·7 Cubic Feet per Hour.	Fire "D," Consumption 25·5 Cubic Feet per Hour.	Type of Fuel.
	Galvanometer Reading.	Galvanometer Reading.	Galvanometer Reading.	Galvanometer Reading.	
A	24·2	31·0	31·9	29·5	6-inch
B	23·5	24·2	27·5	22·9	Pillar
C	27·9	27·5	30·5	31·6	,,
D	24·9	29·1	26·5	26·0	,,
F	28·1	—	—	—	6-inch

The main information to be obtained from these figures is that certain makers' fires and a certain form of burner are more efficient than others, and that a duplex burner fire is an advantage, and, as stated by Mr. J. H. Brearley, gives a higher duty with half the burners than with all. The tests of fuel also prove there is a wide divergence, and only emphasize the deductions to be made from the tests of the fires. There can be no doubt that my Company must recommend fires "A" and "C" only, as they give the best rests. The fuel "F" is not obtained from a gas-apparatus maker, but from the fuel-maker direct. Some of the fuel tests were affected, as the fuel did not fit all fires alike. I suggest this is bad for gas undertakings. It would be much better if all fires and fuels were standardized. Standard sizes would eliminate one source of competition, but still leave the two main factors of design and efficiency. A reduction in the number of

designs would also cheapen production and benefit both makers and consumers.

STAND-BY METERS, ETC.

The question of stand-by meters has received a large amount of attention during the past two years, and was rendered acute by the rejection of the Mirfield clause in 1908, and the acceptance of it in a modified form in the Heywood Gas Act of 1909. That powers to arrange terms for these services is necessary cannot be denied when the intermittent nature of the demand is considered; but it ought to be possible to arrange amicably most of these matters with the individual consumers without the necessity of an appeal to Parliament. My Company have 209 consumers who have gone over to electricity, and three who are users of suction gas for motive purposes. We have arrangements with all of the latter—one paid the whole cost of main and meter; a second guaranteed a minimum amount per quarter or paid the difference; and the third pays a rent for both service main and meter. The private consumers were treated differently. They were originally nearly all large householders, with 20-light and 30-light meters. We drew up a scale of charges for the hire of meter and service-pipe, in which we stipulated that, unless the gas consumed per quarter reached a fixed quantity, we should impose the rent set out in the schedule. The immediate effect was what we wanted—a request to remove the large meter and fix one sufficient for the quantity of gas they did consume. It is not likely that any of these consumers will revert to gas lighting; and the Company were saved a considerable outlay for large meters, while still retaining the partial custom of these electricity consumers.

BYE-PASS LIGHTS AND DRY METERS.

The question of dry *v.* wet meters is one that has given rise to debates at former meetings. It is not, however, my intention to defend one or the other that I make mention of an experiment we have carried out to decide a vexed question. It arose out of a public lighting account; and as we supply most of the gas to the lighting authorities in our area on the average meter system, we were exercised by doubts as to whether the gas consumed by the bye-passes on the incandescent street-lamps was registered by the dry meters in use. The following record amply proves that it is not:—

Three-Light Dry Meters from District (Old).

No. of Bye-Passes in Use.	Gas Registered by Wet Test Meter.	Gas Registered by Meters under Test.					
		1880.	1885.	1893.	18,6.	1897.	1897.
1	103·4	81·5	11·9	50·6	0·1	0·1	1·9
2	101·5	46·7	0·0	0·4	0·0	0·0	0 6
6	115·5	131·3	0·1	119·5	0·1	0·0	100·7
12	122·6	120·7	0·1	2·1	0 1	0·1	1·6
6 burners on full	97·7	110·3	91·0	110·2	60·6	0·0	98 9

Three-Light Dry Meters from Stock (New and Repaired).

No. of Bye-Passes in Use.	Gas Registered by Wet Test Meter.	Gas Registered by Meters under Test.					
		1909.	1909.	1906	1906.	1906.	19·6.
1	95·8	100·5	90·2	3·4	0 0	90·1	0·3
2	97·0	97·7	96·2	50·3	9·9	101·1	0·0
6	100·9	94·3	99·4	91·2	110·5	101·3	110·7
12	103·1	106·0	109·5	109·0	89·6	119·9	100·3
6 burners on full	127·3	154·0	131·5	143·2	130·3	130·9	140·0

Three-Light Wet Meters (New).

No. of Bye-Passes in Use.	Gas Registered by Wet Test Meter.	Gas Registered by Meters under Test.					
		1909.	1909.	1909.	1909.	1909.	1909.
1	101·0	106·6	107·2	100·8	83·2	92·5	79·2
2	102·4	103·5	93·7	101·8	80·0	78·6	81·9
6	109·4	72·0	119·4	110·2	116·7	102·1	111·0
12	54·7	45·3	56·7	59·4	49·7	64·9	55·4
6 burners full on	138·4	144·0	151·3	153·8	158·7	140·1	138·3

All these meters, both wets and drys, had been stamped as correct. The date at the head of the columns is the year when the meter was made. The figures show that the old dry meters registered very badly for the Company; three of them being hopeless. The new dry meters were nearly as bad, but improved when the amount of gas passing increased. On the other hand, the wet meters were better for one bye-pass, two were 20 per cent. and one 8 per cent. slow, instead of the 100 per cent. on the drys. The registration of all the meters when on full load leaves much to be desired, and only emphasizes the general dissatisfaction with the regulations of the Sales of Gas Act and its absurd instructions for testing meters. The most serious aspect is the extent of the use of the bye-pass with incandescent gas-burners and its effect on the unaccounted-for gas. If one bye-pass per house is in use throughout the year, and 75 per cent. of the gas were registered by the meters, the loss at Stretford would be 1 per cent., or 3,200,000 cubic feet per annum, at $\frac{1}{5}$ cubic foot per bye-pass per hour—a result that only strengthens my belief in the wet meter.

G.P.O. TELEGRAPHS.

It is desirable that all gas undertakings, in view of the proposals to place all telephone and telegraph wires underground, should carefully study the Telephone and Telegraph Acts. My Company had recently a sharp experience which may involve them in very considerable and avoidable expense in the future. Two lines of cast-iron pipes have been laid for a distance of over 4 miles within our district by the G.P.O. Telegraph Department; nearly 2½ miles being under the jurisdiction of the Stretford Council and the remainder under the Sale Council. In the Stretford area, the G.P.O. pipes are laid either immediately over or in far too close proximity to the gas and water mains. In the Sale area, the District Surveyor has stepped in and insisted upon them keeping sufficiently far away from both to leave us plenty of room. The Stretford authorities apparently gave their sanction to the application of the G.P.O. without making any inquiries or consulting the other pipe-owners; while, acting on our information, the Sale authorities exercised their powers to the full.

Briefly, the powers of the G.P.O. Telegraph Department are:

Act of 1863—Section 6.

. . . power . . . amongst other things to place and maintain a telegraph under any street or public road and to alter or remove the same.

Section 7.

. . . in the exercise of such power the G.P.O. shall *do as little damage as may be*, and shall make full compensation for all damage.

Section 8.

. . . may remove pipes (but not mains) of gas companies.

Section 9.

The G.P.O. shall cause as little detriment or inconvenience *as circumstances admit*.

Section 8, 1863 Act, and Section 3, 1892 Act.

. . . prohibited from placing telegraphs under streets or roads without the consent of the Urban District Council or any other body having control of the road.

It is also provided that in the event of the Gas Company damaging the pipes and cables of the G.P.O., they are liable to a penalty of £50 per day.

Under these Acts, a gas company has no power to enforce its demands except through the road authority; and probably the G.P.O. officials in most cases will send notice to the surveyor before informing the pipe-owners. It is not obligatory for the G.P.O. to give any information to the latter. This is what occurred at Stretford; and as the only free path for the telegraph conduits was in the roadway, which is paved with pitched granite setts on concrete, they proceeded to lay their pipes under footways that were already occupied by gas and water mains and electric lighting and traction cables. No notice was taken of our protests; and as the Council Surveyor had apparently already committed himself, he was powerless. We have on all occasions been met with the quotation from the 1863 Act, that "as little damage has been done as circumstances permit." The Company cannot prove present damage; therefore, they have no case to take into Court, but will be put to additional and unnecessary expense when any extensive alterations or repairs are necessary.

The corporation undertakings must move to obtain protection through their highways committees; but when supplying outside their own boroughs, they, with the companies, must move the district surveyors to take action as soon as they hear that any such work is in contemplation. This is their only remedy.

This information, with full details, has been placed before the Institution of Gas Engineers and the Gas Companies' Protection Association, with a view to their taking action the next time the G.P.O. have any Bills in Parliament relating to the telegraph or telephone service.

As I fear I have trespassed too long on your patience, I must now conclude with the hope that, if I have not added to the general store of your knowledge, I have directed your attention to certain matters that will do with ventilating; and with the consent of your Committee, I propose to follow the example of our brethren across the Border, and give you an opportunity of discussing the various matters I have raised.

THANKS TO THE PRESIDENT.

Mr. J. G. NEWBIGGING (Manchester), in moving a vote of thanks to the President, said the address dealt with many matters of vital importance to the members as gas engineers, especially in view of the great competition they had to face. There were some points raised to which he would have liked to refer, but refrained because he understood there would be opportunities afforded for discussing the address at some future meeting. Certainly there was no dearth of subjects in it; and he thought one of the best compliments members could pay the President was to contribute papers on any subjects they considered would be of interest to the members generally. He trusted it would give

Mr. Kendrick as much pleasure to conduct the affairs of the Institution as it had given members to elect him to the chair.

Mr. T. DUXBURY (Oldham) seconded the motion. In doing so, he remarked that when they came to read quietly the various subjects dealt with in the address, they would doubtless find it even more interesting than it had been to listen to; and this was saying a great deal. He agreed with Mr. Newbigging that if the members wished to back up the President during his year of office, one of the best ways of doing so would be by contributing papers on subjects of interest to them as gas engineers.

The motion having been carried with applause,

The PRESIDENT, in reply, said he desired to acknowledge the help rendered him in the preparation of his address by his two assistants, Mr. E. Meunier and Mr. James Bridge, and especially the latter, who had carried out the bulk of the tests given in the paper.

Mr. W. LEWIS GALLOWAY, the Chairman of the Stretford Gas Company, said he desired to express the pleasure he and his co-Directors felt at the honour bestowed upon their Engineer by the Manchester District Institution. He and his colleagues recognized that they had in Mr. Kendrick an engineer of considerable ability, whose reputation had been further enhanced by the address he had delivered that afternoon and the compliments paid to him by the speakers.

Vertical Retorts—Discussion on Mr. Samuel Glover's Paper.

The next item on the *agenda* was the deferred discussion on the paper read at the meeting at St. Helens on the 30th of October last, entitled "Vertical Retorts at St. Helens," and given in the "JOURNAL" for Nov. 2.

Mr. GLOVER, on being asked by the President to introduce the subject, said he had nothing really fresh to communicate about the installation which members saw when they were at St. Helens, except to report the continued success of the new venture. He might add that the installation at St. Helens had been visited by engineers and others from north, south, east, near east, and west—in fact, as far as civilization extended. Many of those who had visited the St. Helens Gas-Works came, without notice of their intention, to find the retorts working; subsequently expressing their great satisfaction at what they had seen. Another thing was that the retorts continued to be satisfactory to the workers; and, as engineers, they ought to keep this point in view. If they could introduce a new process, or improve a process, so as to ameliorate the position of the workers, it ought to be done. He claimed that this had been accomplished by the installation of the vertical retorts at St. Helens, and that they had achieved their object in increasing the make of gas per ton better than could be done by any other method. One of the first expert carbonizing engineers on the European Continent paid an unexpected visit to St. Helens, and, after spending several days—Sunday included—examining the practical working of the retorts, expressed his clear conviction that in them they had the simplest, most economical, and most practical retorts for the carbonizing of gas coal extant. Recent examination of the retorts satisfied him that the wear and tear was, as he had anticipated, very small indeed; and he was now more than ever convinced that the cost under this head was going to be small. The absence of expansion of the setting anywhere was very satisfactory; and their highest anticipations had been justified. Mr. Glover added that he had with him plans, which he would show members, if they so desired, of an installation of forty retorts at the St. Helens works on the site of the old baths. These retorts would be erected this next summer.

Mr. T. DUXBURY (Oldham) said he was sure they all agreed—at any rate, he did—that vertical retorts had come to stay. In his opinion, they would be the retorts of the future, so far as they could see at present. The advantages claimed seemed to him to be so great, that sometimes one was inclined to look upon them as fairy tales. They were so many that he was afraid there would not be time to go through them all. There seemed to be a saving in every way, and in every respect. The chief point to him was the great saving effected in labour. He had been making a comparison between the figures given by Mr. Glover and the cost by the combined stoking machinery they had at Oldham; but there was no comparison, if Mr. Glover's figures were really correct. The cost per ton for the two settings was given as 2·75d.; and, taking the same items as Mr. Glover, he found that with the combined stoking machinery at Oldham the cost came to about 11d. per ton, and with their hand charging they got up to 43d. per ton. Another point about these vertical retorts was that by them they would get a much better class of labour. In the future, with vertical retorts in use, the stokers would work under much better conditions. He might add that they had practically decided to put in vertical retorts at the central gas-works in Oldham, because they hoped, among other things, to have from them less dust and smoke in the centre of the town. It seemed to him that if they could adapt to their gas-making business a system similar to that which they had seen at St. Helens, they would certainly get ahead of their electrical friends, in being able in the future to make gas without causing any nuisance whatever. There was one question he desired to ask with regard to the illuminating power of the gas obtained from certain classes of coal by these vertical retorts. This was a matter of importance to towns such as Oldham, where they had to supply gas of a high light-giving quality—as much as 20-candle power—owing to many of the mills having still in use the old flat-flame burners. He wanted to know what gas was made by these retorts per ton of Yorkshire Silkstone coal and Arley Mine coal—if it was 18-candle gas by the "Metropolitan" No. 2 burner. He should also like to know something about the quality of the coke produced by the continuous process compared with that obtained from the intermittent process. He had heard that the coke resulting from the former process was not so good in quality or so hard as that produced by the intermittent charge.

Mr. J. G. NEWBIGGING (Manchester) said most of those present were aware that Messrs. Glover and West were putting up an installation of their vertical retorts for the Manchester Corporation at the Droylsden station. They were making good progress with the work, and he was sorry the installation could not possibly be got ready in time for the members attending that meeting to inspect it. However, it would be completed shortly; and it would be a pleasure to him to show the retorts in operation to any member of the Institution who desired to inspect them. Or if any members cared to look at the work in progress, which was always interesting, he would be pleased to see them. He felt confident in his own opinion that the results which had been realized at St. Helens would be attained in Manchester. In fact, as their installation was a larger one than that at St. Helens, they anticipated improving upon the results. At any rate, in a very short time they would see what they would see.

Mr. E. H. HUDSON (Normanton) asked Mr. Glover if he had fully considered the effect of expansion and contraction on the tiles of the retort; and, if so, what was his opinion on the matter. He also asked if, in view of the repairs and renewals which must necessarily take place at some time, a lot of the saving, compared with horizontal retorts, would not be discounted.

Mr. JOHN WEST said he was glad his friend Mr. Duxbury had raised the question of the illuminating power of the gas, and pointed out that if reference was made to the *brochure* issued on the Glover-West system at the St. Helens gas-works they would find the result of experiments made by Dr. Colman—and he could give no greater authority. In the test with Arley Mine coal, the yield was 11,590 cubic feet with the carbonic acid left in, and an illuminating power by the "Metropolitan" No. 2 burner of 17·82 candles. But they could do almost what they liked in this direction; for, in a test made by himself with a combination of coal and cannel, he got 20½-candle power with a No. 1 "London" burner. If they wanted to make a large volume of gas, the best method was to use vertical retorts; and he thought, from a gas-makers' point of view, and on the ground of economy, it was best to work each coal for the making of the largest volume of gas per ton, and, if necessary, enrich it up to the standard required. They had the matter in their own hands; just as with the horizontal retorts, and could regulate according to the speed and working.

Owing to the lateness of the hour, the discussion had unfortunately to be curtailed.

Mr. S. GLOVER, replying to the remarks which had been made, said he was convinced, from his experience, that vertical retorts, as Mr. Duxbury had observed, had "come to stay." He was distinctly of this opinion, and believed that in future the extensions at all large gas-works would be on the vertical system, especially where constant working and an extra make of gas per ton of coal were desired, and where economy of space in the erection of buildings was a point for consideration. Referring incidentally to the methods of carbonizing adopted by engineers in the Scottish shale-oil works, and to the surprise expressed by them that gas engineers had not adopted their methods, Mr. Glover pointed out that there was a very great difference between the materials to be dealt with. What was good for Scotch shale was not, he said, suitable for gas coal—the systems were quite different. As to the question put by Mr. Duxbury about the quality of the coke obtained from the continuous as compared with that from the intermittent process, he might say that from the latter the coke produced was of closer texture, like foundry coke; while the other was somewhat of the kind of coke coming from a coke-oven. In answer to the question put by Mr. Hudson, Mr. Glover said the expansion and contraction in the ordinary way was very slight and very even. Each part of the setting was maintained at a constant temperature; and, the interior of the retort always working in the same condition, the expansion, whatever it was, was small. It was less than an inch over the whole of the setting; and the contraction being equally divided, the tiles of the setting adjusted themselves to the tapering shape of the retort, making it complete. He did not expect, from his experience, that the saving in labour would be at all discounted by the extra cost of the settings; and he was satisfied, after a fourteen or fifteen months' trial with the vertical retorts, that the cost for repairs and renewals would be small indeed.

VOTES OF THANKS.

A vote of thanks was accorded to Mr. Glover—on the motion of Mr. WATSON, seconded by Mr. JOHN BOND—for the interesting paper he had contributed to the "Transactions" of the Institution, and for his remarks that afternoon.

Before the business concluded, a vote of thanks was passed to the Hon. Secretary, on the motion of Mr. MORRISON, seconded by the PRESIDENT, both of whom paid a warm tribute to the way in which Mr. Whatmough discharges the duties of his office.

The members subsequently had tea together.

ILLUMINATION.

At the Royal Institution, last Thursday afternoon, Professor Silvanus P. Thompson, D.Sc., F.R.S., delivered the second of his course of three lectures on the subject of "Illumination, Natural and Artificial."

The first lecture (a notice of which appeared in last week's "JOURNAL," p. 499) was on the subject of light and lighting; while the second dealt with sources of light, and was illustrated with quite a number of different types of gas and electric lamps—all of which were shown in actual operation. In his opening remarks, the lecturer stated that he had to speak that day of the sources of light and their dependence on certain laws which had to be studied in order to understand what was the value of the recent improvements that had been made in methods of illumination by both gas and electricity. He referred first of all to Tyndall's work on the subject, and to the subsequent further investigations which had been made. The inventions of the last quarter of a century in connection with gas and electric lamps all practically turned upon the question of getting the dominant wave length in the spectrum that was most suitable for the human vision.

The lecturer showed how it was possible to improve the light obtainable from gas by putting into it a solid body which, when hot, would give off more illumination than a gas-flame itself. The early suggestion to hang in burning gas little baskets of platinum wires was referred to; but it was pointed out that these would not for long stand without disintegration the temperature to which they were subjected. He followed the proposal of Welsbach to employ, in a non-luminous or barely luminous flame, a mantle composed of rare earths possessing peculiar radiating qualities. The mantle was no hotter than the flame, though it appeared to be so. Great attempts had been made to secure an actually hotter flame; and the Welsbach "C" and Kern burners embraced various improvements having this end in view. How gas engineers had turned to account the various discoveries that had been made, was demonstrated by the following table.

Light Emitted Per Cubic Foot of 16-Candle Gas Consumed Per Hour.

Burner.	Candle Units.
Incandescent, high pressure	30 to 35
,, Kern	20 to 25
,, ordinary	14 to 19
Regenerative	7 to 10
Standard argand	3·2
Ordinary argand	2·9
Union jet, No. 7	2·44
,, ,, No. 0	0·59

Thanks to the Gaslight and Coke Company, proceeded the lecturer, he had burners of all kinds on view. Some of these were inverted—a delightful and efficient form. Great ingenuity had been exercised in the construction of this type of burner, in order that the heat should not destroy or deteriorate too rapidly the metal work above. With high-pressure air or gas, of course, a higher temperature was at once attained with greater specific radiation; and effects in the same direction were secured with self-intensifying lamps. He drew special attention to the Chipperfield lamp, in the top of which there is an engine worked by the waste heat. This engine, it was pointed out, is of a most simple kind—having no cylinder and no piston—operating a bellows made on the principle of a concertina.

Turning to the parallel improvements in electric lighting, the audience were shown that, instead of the ordinary carbon, there were now flame arc lamps, fitted with carbons impregnated with various chemicals. By this means, it was remarked, a flame was obtained at the bottom of the lamp, which could therefore throw its light uninterruptedly straight downwards; and this flame gave more of the rays to which eyes were accustomed than did the white light. The Nernst lamp with its filament of rare earths provided a good light; but a drawback to its use was the fact that it was necessary to wait two or three minutes for the preliminary heating which had to take place before the glower began to glow. Then there were metallic filament lamps—the result of the finding of materials which could be heated up to a higher temperature than the practical limit of carbon. The first of these was osmium, which, strangely enough, had also been suggested by Welsbach, Osmium, however, was a very rare material; and there was not enough in the world to render it possible to manufacture the lamps in sufficient numbers. Tantalum was next brought into service, and afterwards tungsten—which was a most unmanageable metal. The difficulty had been to make wires out of tungsten, and extraordinary ingenuity had been exercised in this direction. Now, everybody was substituting for the ordinary carbon glow lamp these tungsten lamps, under the name of "osram." One other improvement that should be mentioned was the Cooper-Hewitt vacuum lamp, consisting of a tube containing only mercury and mercury vapour. The last type described was the regenerating flame arc lamp.

In conclusion, the lecturer remarked that he had gone over some of the matters connected with specific radiation, and the improvements that had been made with gas and electricity in this direction. It was obvious that with these higher temperature sources, the light must be produced under better conditions, as there was being obtained a larger proportion of those radiations to which the eyes were most sensitive.

SOCIETY OF BRITISH GAS INDUSTRIES.

The Annual General Meeting was held last Thursday, at the Waldorf Hotel. Mr. CHARLES CLARE, the Chairman of the Council (who on this occasion was retiring from that office), presided.

The SECRETARY (Mr. Arthur L. Griffith) read the minutes of the last general meeting; and they were confirmed.

The CHAIRMAN then presented the following

REPORT OF THE CENTRAL COUNCIL.

In presenting the fourth annual report to the members of the Society, your Council have pleasure in recording that, during the past year, good work has continued to be done. There are various important subjects claiming the attention of the Society which require time for development.

The membership of the Society has steadily increased; and now includes most of the important firms in the gas industry. The Council are pleased to note that members are making full use of their respective Sections by bringing forward for consideration from time to time matters of interest, as only by this means can they derive full benefit from the Society.

A final meeting was held in February, 1909, with the Institution of Gas Engineers on the question of Standard Clauses of Contract; and the clauses were then finally approved by both Councils, and recommended for adoption. It is encouraging to note that many engineers have already made use of, and referred to, these clauses in issuing specifications.

One of the principal matters now under consideration is the abatement of the smoke nuisance. A valuable paper was read by Mr. C. E. Brackenbury at the autumn meeting on "Some Legal Aspects of the Smoke Nuisance," and an interesting discussion followed. It is hoped to arrange a conference on the question with representatives of the Institution of Gas Engineers, the Coal Smoke Abatement Society, and other Societies.

Your Council regret that the Bill introduced into Parliament in June, 1908, with the object of extending the powers of the Board of Trade in granting Provisional Orders, and of simplifying and cheapening procedure under the Gas-Works Facilities Act, was not proceeded with, owing to pressure of business. It is hoped that the Bill will be brought in again at the earliest opportunity.

The important question of the standardization of refractory materials is receiving the careful attention of the members interested.

The Society is fortunate in having secured as its President for the coming year Mr. J. H. Balfour Browne, K.C.; and your Council look forward with confidence to a successful year under his guidance.

The Society is much indebted to Mr. Thomas Newbigging, M.Inst.C.E., the retiring President, who has taken the greatest interest in its welfare, and tenders him its very best thanks for his valuable services and for his encouraging addresses. The Council are gratified that he has accepted a Vice-Presidency, and hope to have the benefit of his experience and advice in the future.

The financial position of the Society is satisfactory.

INDISPOSITION OF MR. THOMAS NEWBIGGING.

In connection with the reference in the report to the retiring President, a letter of regret at absence from Mr. Newbigging was read by the Secretary. It ran as follows:

I regret to say that I am still laid up by the doctor's orders, and by my own bodily weakness. The illness from which I am slowly recovering has left me in a very frail state, and quite unfit to travel. I need not tell you how much I feel the deprivation. I was looking forward to the great pleasure, as well as privilege and honour, of installing my friend, Mr. Balfour Browne, K.C., as my successor in the presidency of the Society on Thursday next, when this unfortunate illness intervened. You cannot regret my enforced absence more than I do myself; but there is no help for it. Fortunately, the Council will have no difficulty in providing a substitute to do what is necessary. You will have a successful and pleasant reunion; of that I have no manner of doubt. My warm good wishes will be with you on the occasion.

OFFICE-BEARERS.

It was announced that the office-bearers for the ensuing year were:

PRESIDENT:

J. H. BALFOUR BROWNE, Esq., K.C.

VICE-PRESIDENTS:

DUGALD CLERK, Esq., F.R.S., M.Inst.C.E., F.C.S.
THOMAS NEWBIGGING, Esq., M.Inst.C.E.

CENTRAL COUNCIL:

Chairman: FRED. J. WEST.
Vice Chairman: H. JAMES YATES.

W. ARMITAGE DRAKE,	representing Section	I.
HUGH F. WRIGHT	,,	II.
HARRY J. DONKIN	,,	IIA.
THOMAS S. CLAPHAM	,,	IIB.
W. J. JENKINS	,,	III.
J. R. PICKERING	,,	IV.
JOHN MACKAY	,,	V.
H. JAMES YATES	,,	VI.
THOMAS G. MARSH	,,	VII.
W. D. HELPS	,,	VIII.
H. N. BICKERTON	,,	IX.
W. B. GIBBONS	,,	X.

Honorary Secretary: CHARLES CLARE } *Ex-Officio*
Honorary Treasurer: H. M. THORNTON } Members.

Secretary: ARTHUR L. GRIFFITH, 46, Queen Victoria Street, E.C.

THE NEW CHAIRMAN.

It will be observed that there is a change in the chairmanship of the Council; Mr. Clare, who has held the position from the

inception of the Society, has retired, for the sole reason that he believes the occupying of such an office by one man tends to cause affairs to drop into a sort of rut. On this ground only, the change has been made.

On Mr. Fred. West taking the chair, the members enthusiastically passed a vote of thanks to Mr. Clare for his services.

Honorary Member.

Mr. C. E. Brackenbury, Barrister-at-Law, Assoc.M.Inst.C.E., who has rendered considerable and valuable service to the Society by the reading of papers, and by the drafting of the model contract clauses, was elected an hon. member of the Society.

Vice-Presidents.

It was formally, but with much gratification, announced that Mr. Thomas Newbigging had accepted a vice-presidency of the Society; and the honour of election to a similar position was conferred upon Mr. Clare for his conduct during the past four years of the duties of Chairman of the Council.

Induction of Mr. Balfour Browne, K.C., as President.

Mr. Dugald Clerk, F.R.S., said he was sorry that the retiring President (Mr. Thomas Newbigging) had been ill—it was nothing serious—and was unable to come to the meeting to inaugurate the presidency of Mr. Balfour Browne. He (Mr. Clerk) was sorry on account of the illness of Mr. Newbigging, but was glad to have an opportunity of transferring the presidency of the Society to another brother Scot. It was rather remarkable that, of four Presidents the Society had chosen, three of them should have been Scots—Mr. Newbigging, Mr. Balfour Browne, and himself. In their new President, the Society was exceedingly fortunate. The first three Presidents were all engineers; and Mr. Balfour Browne was an industrial and (as he reminded him) an industrious lawyer as well. Mr. Balfour Browne had long been connected with industrial matters. His earliest book relating to anything dealing with the subject was "The Law of Carriers," published in 1873, "The Law of Rating" in 1874, "The Rating of Railways" in 1880, "The Law of Compensation" in 1896. Then there was a general book on South Africa in 1895; and "Essays, Critical and Political" in 1907. Their new President had, in fact, done a large amount of book-writing; and he (Mr. Dugald Clerk) could sympathize with him. Mr. Balfour Browne assured him that he found the writing of books one of the greatest pleasures and most restful occupations that a busy man could have. He (Mr. Clerk) had also found the same thing. Without further words, he would transfer Mr. Balfour Browne to the presidency of the Society.

Mr. Balfour Browne, on stepping to the chair, was received by acclamation. He thanked the members for the honour done him in electing him their President, and then proceeded to read an Inaugural Address, entitled

TRADE AND LEGISLATION.

The President commenced his address by referring to recent events in the political world—more especially to the demand for a reform in the constitution of the House of Lords. He was distinctly in favour of a Second Chamber; but not one constituted like the House of Lords of to-day. After alluding to some of the schemes of reformation proposed, Mr. Balfour Browne proceeded: Now Britain is a trading nation; and the trade and industries of the nation are the foundations of our national greatness. It is true we have produced men great in science, in law, in world politics, in government; and it is well that these should find places in a reformed Second Chamber, as, indeed, they do find places in the unreformed House of Lords. But I am convinced that no Second Chamber, no Senate, no House of Parliamentary Lords, would be complete without direct or indirect representation of the trade of Britain.

That there has been a necessity for a closer connection between trade and legislation has been widely felt; and Lord Wemyss, in July, 1909, gave notice of a motion in the House of Lords which purported to deal with this matter. The resolution was—

> That, in the opinion of this House, it would be for the public good that important national trading and other representative societies should each name three members of the existing peerage in the current and each succeeding Parliament to speak and act on behalf of such societies on all questions on which they are interested, and that the names of the Peers so nominated be entered in the "Journals" of the House. (2) That the Lord Chancellor, the Marquess of Landsdowne, the Earl of Crewe, and the Earl of Halsbury be empowered to determine what societies are of sufficient importance to be admitted to the said privilege of nomination.

Although, in my view, the scheme was a crude one, and amounted to little more than the retaining of certain Peers of Parliament to act as it were as Counsel for the great trade organizations of the country, it was a recognition of the necessity to which I have referred—of a closer connection, even in the Second Chamber, between the great trades and industries of the country and the legislation which finds its way on to the Statute Book. At that time, the opportunity of giving effect to this important claim did not offer; but now that reform of the House of Lords has become part of the policy of the Unionist party, and that the Government has hung a sword by a thread over the Peers, it seems to me the right moment to urge the claims of societies such as yours to representation in our new Second Chamber.

Lord Wemyss, in a letter to the "Financial News" of July 29, 1909, made the suggestion that the societies who were to have as it were the privilege of being represented by Counsel in the House of Lords were the Royal Institute of British Architects, the Royal Academy of Arts, the Society of Authors, the Building Trade Federation of the United Kingdom, the Society of Engineers, the Gas Companies Association, the London Chamber of Commerce, the Machinery Users Association, the Royal College of Physicians, the Railway Companies Association, the Royal Sanitary Association, the Shipping Federation, the Surveyors Institute, and the Employers Parliamentary Council; and he hoped that other bodies would be added to the list. I confess that many of these bodies seem to me to have already ample representation in relation to legislation, and, further, that the list—in including artists, physicians, and authors—is not really nearly so representative of trade and industry as it ought to be; and I am convinced that our Society has, for many reasons, a strong claim to be more in touch with the legislative proposals of Parliament. That is why I desire to see the trade of this country directly represented in the House of Lords.

In your memorial to the President of the Board of Trade of June 23, 1908, you pointed out that the industries carried on by the members of your Association suffered from the way in which lack of security deters the proprietors of non-statutory gas undertakings from developing their business, and that the lack of security was a very serious obstacle to the formation of small local companies, and the construction of works to supply gas in many small towns and country villages. You also drew his attention to the fact that the uncertainty as to the result of, and the cost inseparable from, an application for a Provisional Order deters undertakers from approaching the Board of Trade, and you stated that the powers of the Board of Trade in granting Provisional Orders, and of simplifying and cheapening procedure under the Gas-Works Clauses Act, would result in increase of home trade and employment, both to you as manufacturers and to the public.

In that memorial you called attention to some great and some minor evils; and concerning these I would desire to say a few words. On the memorial nothing seems to have been done. It is true that a Bill, called the Provisional Order Procedure Act—to enable rules to be made regulating the procedure with respect to Provisional Orders made by the Board of Trade and the Local Government Board under certain Acts of Parliament—was introduced; but nothing came of it. In one of the sentences I have quoted, you touched on the real germ of the disease from which you and trade generally is suffering; and that is the lack of security. This is due not only to the facts you point out, but to the trend of current politics and legislation.

There has for a good many years been a tendency to concentrate all public functions in the hands of public authorities, instead of allowing them to be carried on by individual and private enterprise under the control of the State. There may have been much to be said for the transfer of some of those semi-public duties from the hands of companies into the hands of municipalities. Water, for instance, is a necessity of health; and its supply in ample quantity and of excellent quality is a sanitary necessity. Again, it cannot be superseded by any other article of commerce; it must always remain a monopoly. But it is not at all certain that the same reasons apply to the transfer of gas undertakings. The manufacture and distribution of gas is a trade, and a trade in a manufactured article. Gas is a commodity that has to be sold and is not paid for by a rate. It is a competitive illuminant with many others; and when these undertakings get into the hands of corporations, which may also be the owners of electric lighting and power works, there may be a serious detriment to the public from such monopolistic appropriations.

But when municipalities have become monopolists of any great industry, there is a tendency for that monopoly to extend itself in various directions. We know how railway companies, which were introduced in the first instance merely to be the providers of iron roads upon which the public were to be entitled to run with their locomotives and carriages, became, in time, the sole carriers upon their own permanent way. We have seen how this monopoly of the long-distance traffic of the country has spread itself, and how to-day railway companies are not only doing the carriage by rail, but the collection and delivery of goods by carts in our towns, and how they are running the great town carriers off the road. We know, too, how they have become on a gigantic scale the owners of steam-boats, which not only carry on a ferry service ancillary to carriage by rail, but carry on an extensive trade with Continental ports. Further, we see how this species of monopoly spreads when we know that railway companies have become hotel proprietors on a large scale. The same observation is true of the municipal monopoly which it has been the desire of the State to create. Corporations not only run tramways but have in that connection provided extensive manufacturing and rolling stock repairing shops, and in that way are competing, with ratepayers' money, with a legitimate enterprise which used to be carried on by means of private capital. We know, too, that some corporations have not only made a good thing out of their gas undertakings—I see that one of them last year carried the large sum of £70,000 from the gas profits to the relief of rates—and that they have, again in unfair competition with private enterprise, started shops for the sale of gas and electric fittings. In all these respects private enterprise is going to the wall; but it is upon private enterprise that you must rely for all pioneer work, for all initiative in trade, and for the real adventurous development of industry. If you kill that, the country must stagnate; and in

national life it is impossible to stand still. Unless we go on, we must fall back; and this is one of the perils to the country to which I desire to point.

This tendency to acquisition of gas-works by local authorities has operated largely. So much so that, when a non-statutory company applies to Parliament for statutory powers to get the necessary security the absence of which you deplore in your memorial, it has almost become the invariable rule for the local authority to apply for, and secure, a purchase and sterilization clause as a condition of the passing of the company's Bill. Under such circumstances, it is not a matter for wonder that, as your memorial pointed out, during the 38 years since the Gas-Works Facilities Act became law, only fifty non-statutory undertakings have applied to the Board of Trade for statutory powers, and that there are still 880 gas-works in the United Kingdom being worked as non-statutory undertakings. If they enjoyed the better security which statutory recognition would give them, it would undoubtedly lead the companies to invest money in useful developments, and it would induce others to supply the small towns and villages which are at present without a supply.

It is, of course, true that the expense in obtaining Orders from the Board of Trade, and the uncertainty, have prevented the Act being of much use; and it is obvious that these expenses should be cut down. Why the promoters of Private Bills and Orders should have to pay fees to the Houses of Parliament, which, in the aggregate, are sufficient to provide for the maintenance of the structure and the payment of the whole staff of the Palace of Westminster, I never could make out. But a mere Private Unopposed Bill, when no counsel's fees have to be paid (so my withers are unwrung), costs some hundreds of pounds; and all this, of course, is dead capital—a millstone round the neck of the enterprise, not living capital which is going to produce gas.

This question of "security" for home enterprises is even larger than it seems. We have recently heard of the flying millions which are seeking investment in foreign countries, instead of staying at home to enrich our own wage-earners and manufacturers. It is obvious that this drain of capital out of the country is a matter which has to be deprecated in the interests of manufacture and of labour. It has, in recent heated controversy, been ascribed partly to the lurid political atmosphere which has been produced by the Finance Bill, and partly to the inducement which the existence of tariffs in other countries, and the absence of protection in our own, gives to manufacturers to establish works in foreign countries behind the tariff walls. Such matters are too political for me to deal with in this place. But I can, without becoming a partisan, point out that, to some extent, the insecurity which has led to the decampment of capital is due to our past legislation. We know that the Patent Act, which was passed with the object of compelling those who took out English patents to work them in this country, has already had a beneficial result in bringing foreign capital into this country, and also in finding employment for many workmen here.

If it is good to have foreign capital invested here, surely it must be bad to have so much of our own capital invested in foreign countries. But the unwise legislation of the past has been a means to that ruinous deportation. The legislation I refer to is that which has checked private enterprise in this country, and has unduly favoured the cumbrous operations of municipal corporations and local authorities. For instance, the necessity under which promoters of tramways were to obtain the consent of the road authority as a condition precedent to the obtaining of tramway powers has been a distinct disadvantage to the development of tramway enterprise in this country. The petty jealousies which have existed between small local authorities have prevented the useful development of running powers over light railways and tramways; and in most cases where compulsory running powers have been asked for, Parliament has—in its favour for municipalities—refused the grant of these. I only refer to this class of legislation as an illustration of the trend of legislation which is apparently to municipalize most of our public enterprises.

This tendency is not only manifested when a transfer takes place, but the coming events cast their shadows before. For years before the water undertakings were transferred by statute to the Metropolitan Water Board, Parliament was in the habit of putting in the Companies' Acts clauses forcing them to provide sinking funds for the benefit of any ultimate purchaser, and also clauses, which were called "sterilization clauses," which prevented the Companies reaping any benefit, in case of such a purchase, from the capital expenditure which was necessary to keep pace with the public requirements. Indeed, in effect, Parliament was making the Companies, who were in the inception trading companies for profit, trustees for the public. Under such circumstances, no enterprise could prosper. In the same way the London Dock Companeis recognized the necessity for improvements in their docks. The competition for the shipping of the world is exceedingly keen. Some of the Continental ports have been enlarged to a great extent, and have been assisted in their enterprise by Government subsidies. But in the case of some of our London Docks, though Parliament recognized the necessity of improvements, they also desired that the shareholders in these Companies should derive no benefit from the improvements which were to be made by the new capital, and insisted on a sterilization clause similar to that which had been put in the Water Companies' Acts. The result was that the improvements were not carried out; and the London Docks fell behind in their competition with foreign ports.

Here, again, is an illustration of the effect of the short-sighted legislation which has discouraged by every means in its power private enterprise, and has encouraged by various means the municipal trading which has certainly not been an unmixed benefit to the community. It may be known to some of you that, with a like object in view, when electricity as an illuminant first sought parliamentary sanction, the Legislature, with the view of securing that electrical undertakings should only in their pioneer stage be in private hands, provided that after 21 years these should be purchasable by the local authorities. This provision was made by the Electric Lighting Act, 1882; and the clause in question was on similar lines to that which was contained in the Tramways Act, 1870. The result of this legislation was that capital buttoned up its pockets, nothing was done under the Act, and Parliament had to climb down, and passed an Act in 1888 extending the period of concession to 42 years.

In the same connection, Parliament made another mistake. In relation to electrical undertakings in London, with the view, I suppose, of keeping the undertakings small and confining them to limits within which the local authorities could at the end of 42 years purchase, forbad the companies to make any contracts among themselves, and made it illegal for one such company to supply electrical energy to another. The result of this prohibition has been to make Londoners pay far more for the illuminant than they ought to have done. The secret of cheap production is large-scale production; and this is essentially the case in relation to the generation of electricity, where success depends so much upon the load-factor, and where a large area with varied industries gives what the producer requires for economical production —a large diversity factor.

I have given enough illustrations to show that legislation has produced frost; that it has discouraged private enterprise in this country; and that, in consequence, there has been a trek of capital into other lands.

It is sometimes said that the depression of trade from which this country is suffering, the want of employment of which the labouring classes have to complain, is due to some defect in our manufacturers or to want of technical education in our workmen. With regard to the latter libel, I say it is not true. There is no use talking to men about better technical education when they cannot get work. It is prosperity which will teach men accomplishments. Adversity, which cannot be mended, only teaches despair. As to our manufacturers, again I say that they require the encouragement of prosperity to embark in new developments and in enterprises. I was glad, however, to see from the valedictory address of your last President, my friend Mr. Newbigging, that, in his recent visit to the United States and Canada, he found that the gas machinery apparatus and plant of British makers are held in high estimation, and that lack of originality and imitation of your work were striking characteristics of their manufacturing methods. These excuses, therefore, are unfounded; and the insecurity which has been produced by errors in legislation, by faults in policy, is the real reason why we have to deplore a stagnation, or retrogression in our trade, which, if it were to continue, would spell ruin for the country.

It is these considerations which force upon one the immediate necessity of further and better representation of trade interests in the legislative machinery of the country; and your Association, of which you have asked me to be the somewhat unworthy head during the present year, must use every effort to bring about this much-needed reform, not merely in the selfish interests of the trade you so ably carry on, but in the interests of the country as a whole.

At the close of the address,

Mr. DUGALD CLERK said they had to thank their distinguished President for his able and interesting address. He found himself thoroughly at one with him on many of the points raised in the address. All the points were interesting; and all were ably dealt with. But there were two sides to politics; and it was quite natural that some people should look at the matter in one way, and some in another. He (the speaker) happened to be a Liberal, and accordingly he did not sympathize with some of Mr. Balfour Browne's remarks. From his point of view, he could quite see the full logical justification; and he sympathized entirely with him in his scheme for the reform of the House of Lords. There should undoubtedly be a Second Chamber. He agreed with him that the Second Chamber should have due powers, and also that it should act as a brake and fly-wheel. He had not one word to say against the House of Lords. It contained a lot of distinguished men. A House that had included such men as Lord Kelvin, Lord Rayleigh, and other eminent scientific men and statesmen, was a House that should command respect. He was not in sympathy with those who were always abusing the House of Lords. It had done good service; but the times were altering. He was quite in agreement with the President as to trade and commerce being represented in the Second Chamber; this being essential to the success of the country. In his opinion, one-third of the members should be hereditary peers; and the remaining two-thirds should be elected by the great bodies of men who had organized themselves in the country in connection with its business, scientific, and industrial work. The engineering societies should certainly be represented. The Institution of Civil Engineers, for instance, included 8000 members, who were doing practically all the engineering work of the world. In the same way, the Institution of Gas Engineers and the Society of British

Gas Industries had a right to be represented in the new body proposed by Mr. Balfour Browne. He most thoroughly concurred with what had been said as to Great Britain being a trading nation. Much had been said lately about Britain being degenerate. Neither in Science, Art, nor Industry had Britain been so thoroughly alive and progressive as now. He did not agree with those who talked about German education being superior to that of this country. Great Britain was second to none in the world in its inventions and discoveries. If America or Germany had invented the steam-turbine, the whole world would have rung with the achievement; but because it was our own modest Parsons, nothing was heard about it but abuse. He did not consider the country was in any danger from capital going abroad; and he gave his reasons. Regarding the new Patent Act, he had got out a list of concerns that had been established in this country directly through its operation; and they amounted to practically nothing. In his opinion, the Act had done more harm than good. He was decidedly at one with Mr. Balfour Browne, as to the desirability of modifying legislation in such a way as to encourage the sense of security. There had been a great deal of legislation due to the legislators not being business men; and he instanced the Coal Mines Regulation (Eight Hours) Act. The address of their President was a stimulating one; and he hoped it would lead to great improvement in the law of the country, and to an awakening in the great industrial bodies that at present stood indefinitely in the legislation of the country.

Mr. Fred. West, in seconding the vote of thanks, said the address had been most interesting; and he was quite at one with the President in almost every point he had touched upon. The connection that Mr. Balfour Browne had made between the House of Lords and business was a clever one; and he agreed with him entirely as to the industrial world being represented in the Second Chamber. With reference to municipal trading, he thought they as a Society might have a discussion on the subject, as most trading firms were badly hit by it. Such a discussion might take place during the presidency of Mr. Balfour Browne, who had a large knowledge of this important question.

The motion was carried by acclamation.

The President, in responding, said he had just returned from a General Election, in which he had fared badly; and, in preparing his address, he had prided himself on its being absolutely colourless. But Mr. Dugald Clerk had fallen foul of him, and had questioned some irrefragable truths. He should like not only to discuss municipal trading, but to have a night with Mr. Dugald Clerk on certain of the matters to which he had referred. He thanked the members for the way they had listened to him. He was convinced that both tariff reformers and free traders had one object at heart, and that was the prosperity of the country. They merely looked at the matter from different points of view; but he thought free traders were getting converted. [Laughter.]

Shortly afterwards, the members informally dined together. "The King" and "The President" were the only toasts proposed; but there was an excellent musical programme, and this and social intercourse combined to make a pleasant evening.

THE RETORTING OF COAL.

By Henry O'Connor, F.R.S.E.

[A Paper Read before the Scottish Branch of the Society of Chemical Industry.]

On the evening of Tuesday, the 22nd ult., Mr. H. O'Connor, Assoc.M.Inst.C.E., F.R.S.E., read a paper on the above subject, before the Scottish Branch of the Society of Chemical Industry, in the Glasgow and West of Scotland Technical College—Mr. David J. Playfair presiding.

The author said that the subject he was to introduce was a very important one, when it was considered that in Great Britain alone some 15 million tons of coal were annually carbonized for the making of gas. For many years gas engineers were justly accused of showing little progress in the methods of applying the necessary heat to the conversion of the solid coal into the very complex matter called "gas" and the residual coke. Of recent years, however, proposals had been brought forward for improving the yield of gas, both as to quantity and quality, whether illuminating or calorific, and also making a better coke. There was no doubt that one of the greatest advances was made when Siemens introduced his gas-fired furnace, when he proposed the partial combustion in the furnace and the final conversion to carbonic acid among the retorts. The adoption of most of the modern methods of retorting coal would be impossible without this system of firing.

The next movement in the direction of improvement occurred about twenty-five years ago, when M. Coze introduced his system of sloping retorts at Rheims. He was not the inventor of sloping retorts, as these were apparently tried by Murdock, the discoverer of gas. A description of the setting and working of inclined retorts was given; and then the author proceeded to say that the most recent adoption of sloping retorts on a large scale was probably that of Mr. W. R. Herring, at the Granton Gas-Works, Edinburgh, where the average make per ton throughout the year 1904 was 10,423 cubic feet, in 1905 10,802 feet, and in 1906 10,973 feet. The entire costs of carbonizing, including wages for foremen, discharging coal, attending to coal-breakers, elevating and conveying coal to the bunkers, charging and drawing the retorts, attendance to mouthpieces, cleaning and repairing retorts, greasing machinery, furnace attendants, hot-coke conveyor and engine men attending to the machinery, were in 1904 1·482d. per 1000 cubic feet, in 1905 1·3d., and in 1906 1·28d., or probably little more than half the average cost of such work in the principal cities in this country. These figures were actual working results, and not test results only. The results in residuals obtained in the working of the "forty-fives" of the late Mr. G. R. Love, of Guildford, were given in a report by Dr. Harold G. Colman. A more recent plan, which had been adopted in England with horizontal retorts, and which was first suggested by Mr. Charles Carpenter, of the South Metropolitan Gas Company, was to fill the retort completely with coal, so as to utilize the whole space and cause the gas to pass quickly out of the retort, and so reduce the number of times the mouthpieces had to be opened, which, of course, caused a certain loss of gas. There was no doubt the idea of this system was due to the methods adopted in coke-oven plants.

Coke-oven installations were described, as well as the chamber retorts of Mr. Thomas Glover, of Norwich. There was, it was stated, a marked decrease in the free carbon in the chamber-retort tar, as compared with ordinary retort tar, and an increase in the proportion of heavy oils, showing that the volatile products of the coal were not subjected to the action of so high a temperature before escaping from the chamber, as was the case with ordinary retorts. The gas made per ton amounted to 13,247 cubic feet, of an illuminating power of 14·94 candles, as compared with 15·84 candles in ordinary retorts. The gross calorific power, by Junkers' calorimeter, was 549·48 B.Th.U., as compared with 565·9 B.Th.U. in ordinary retorts; and the net calorific power, 493·9 B.Th.U., as compared with 512·6 B.Th.U.

The Dessau vertical retorts were then described, and the results obtained at Sunderland given; these being, for 48 hours, in a setting of sixty retorts, with eleven-hour charges, a yield of 12,028 cubic feet of gas per ton of coal carbonized (Holmside Durham), of 17·55-candle power, with a calorific power of 635·4 B.Th.U. gross, and 568·9 B.Th.U. net. The Woodall-Duckham system of vertical retorts, with continuous carbonizing, was described; and the results obtained at the Nine Elms Gas-Works were given as: Coal used (Birley Silkstone), 86·3 tons; gas made per ton, 12,423 cubic feet; illuminating power, 15·82 candles; sperm value, 674; calorific value 596·6 B.Th.U. gross, and 530·7 B.Th.U. net. It was at first thought that the introduction of steam to make some water gas would be advantageous; but up to now this had not been found so. This would, of course, utilize some of the heat in the coke after carbonization, which, unless it could be fed into the furnace directly while hot, was lost. If a lower candle power and calorific value would satisfy the people of this country, as it did on the Continent, then no doubt steaming could be carried out, and full advantage of this heat be obtained. The Glover-West verticals at St. Helens were then described; and the results were given as: Coal used, Thornley, Barrow, and Wigan Arley; yield per ton, 12,561 cubic feet; illuminating power, 15·66 candles; calorific power, 578·2 B.Th.U. gross, and 517·6 B.Th.U. net.

The latest proposals for vertical retorts came from Mr. Herring, of Edinburgh, who was erecting at the Granton Gas-Works a single setting of these retorts upon the same area as is at present occupied by one of the ordinary sloping retort beds—a set of six verticals, of which he was able to show them the drawings, kindly lent him by Mr. Herring. The arrangement allowed of the heating of the retorts in almost any manner, either with the greatest heat at the top, the middle, or the bottom, by means of ports for the admission of the producer gases and the secondary air at any level from top to bottom; suitable means having been provided to close off any ports not required. Mr. Herring did not suggest that these designs were in any way final; but he had erected them purely as experimental retorts, with every possibility of testing, so as to obtain the best arrangement for future carbonization of the coal with which he had to deal. The retorts were built of grooved bricks, and were made square to avoid the expense of special bricks, and in the hope that the corners would become filled up in time with carbon. A good taper was given to them, so that the coke might not be obstructed in leaving. In most things he had followed vertical oil retort practice, as he pointed out that this industry had had a number of years' experience, which must have led to the survival of the fittest.

With small charges, the separation of the carbon occurred so energetically that the ascension pipes were constantly becoming blocked, and coke must be drawn before being completely burned off. A large charge, on the other hand, was more evenly distributed than a thin one, and the decomposition, with filled retorts, was avoided; so that higher temperatures of carbonization could be employed. It was evident that filling the retorts had made a different tar, which should be easier handled, and had removed many of the gas manager's greatest troubles—viz., stopped ascension pipes and pitched hydraulic mains. Heating surface, compared to the weight of the charge, was a good indication of the comparative efficiency; but this was only the case with vertical and completely filled retorts, as it was the heat acting directly on the coal which only was wanted. Tests had shown that with tiles and asbestos on the tops of horizontal ordinary retorts, where the heat was not wanted on the inside, the quality of the gas had been improved. This might be expected, as the heat would convert some of the hydrocarbons into the solid carbon which usually

collected on the inside of a partially-filled retort, and must thereby reduce the illuminating power. The lengthy contact with the hot side of a retort which was partially filled must injure the gas; so that an improvement might well be expected when there was little room, and, consequently, a quick passage of the gas away from the heat.

The requirements of coal gas, and the illuminating power, were daily becoming of less value, and the calorific value was of more and more moment. What this calorific value was to be fixed at was a matter of the coal available. On the Continent they were satisfied with a much lower figure than in this country; but tests must be made, and without delay, by all gas undertakings so as to ascertain the extent of the calorific power obtainable from the coals that were ordinarily procurable. In many cases they would not have the necessary apparatus at hand for the purpose; but they should arrange for a periodical test of each of the coals which they were using when being carbonized under the usual conditions prevalent in their works. Further than this, they should aim to find out the particular method which would give the best heating result from these coals, so that they could alter the processes accordingly. The published tests by the coalowners were not of much assistance in this matter; but they could be taken as a guide to the extent to which their efforts might be aimed. The apparatus for carbonizing coal varied so greatly in certain ways that similar results could not be looked for in different gas-works. The great aim should be to obtain as much methane as possible, as such a gas had a calorific power of 1024 B.Th.U. gross and 919 B.Th.U. net; while hydrogen had only 326 B.Th.U. gross and 272 B.Th.U. net, and carbonic oxide 323 B.Th.U. gross and net—all per cubic foot. Consequently, any process which would increase the proportion of the former in the gas made must prove the one which would be likely to succeed in the future.

[The paper was illustrated by a number of views, shown by means of a lantern which has been designed by Professor Gray, of the Technical College.]

Discussion.

The PRESIDENT, in inviting discussion, said they would be very glad if any of the visitors who were favouring them with their presence would join in the proceedings.

Mr. JAMES M'LEOD (Greenock) considered that Mr. O'Connor's paper was very opportune, coming at a time when the gas industry was more or less on the *qui vive* on the question of vertical or horizontal retorts. The idea of the vertical retort was not a new one. On looking over some old minutes of the Greenock Corporation Gas Department, he found that Mr. Samuel Stewart had gone into this question about thirty years ago, and had made a report upon it to his Committee. Although there was a good deal of opposition to the vertical retort, he thought it would be the ultimate system of carbonizing coal. He had occasion to get some information about one of the systems quite lately, and one of the points about it that struck him was that for an output of 750,000 cubic feet of gas the ground space necessary was only some 30 ft. by 70 ft. This was very economical. Another thing was that the machinery required was of the very simplest kind. It stood to reason that a machine which had merely to drop the coal into the retort was much less subject to wear and tear than a horizontal charging machine. He considered the vertical retort had a very great future before it; and while, on the whole, he did not think that the results were as yet very much better than those obtained with the best systems of horizontal charging, he still thought that, for the reasons of less ground space and less wear and tear in the machinery, it had come to stay.

Mr. D. VASS (Airdrie) referred to the coal which could be used. Nuts were quite sufficient. In gas-works they had been in the habit of breaking coal into cubes of from 4 to 6 inches. With vertical retorts, on the continuous system, it would be necessary to reduce the coal to a much smaller size. But if they did so, he thought they would have a much better coke. The Woodall-Duckham system was the best arrangement he had seen—taking in a few pounds of coal every minute. It worked very sweetly. To his mind, verticals were to be the retorts of the future. At present, they were trying to get improved results from horizontals by charging them heavier; but the difficulty of getting a pusher which would push out a large quantity of coke was troubling them. In coke-ovens they had found it advisable to stamp the coal into a solid mass before putting it into the oven. In this way they had a coherent mass, which was easily pushed out after it was carbonized. In gas-works the coal was thrown in loosely; and when they subjected it to a pusher after it was carbonized, it did not come out freely. The vertical retort got over this difficulty by the mass bearing its own weight and falling to the bottom, and so being formed into something like foundry coke.

Mr. J. ARNOLD FLEMING (Glasgow) had been very interested in the firing of the retorts. He was interested in the construction of ovens, and specially interested in the building of these vertical retorts. He had found that in building square retorts or furnaces, about 20 feet long, with special bricks, they were troubled by the expansion to a much greater extent than with either the round or the oval shape.

Mr. G. R. HISLOP (Paisley) said Mr. O'Connor had raised some very important points. All who were connected with gas manufacture had been giving the question of horizontal or vertical retorts considerable attention during the last few years. No doubt many were very much gone on the idea of vertical retorts; but he maintained that it would require a good deal of time yet before horizontal retorts were all displaced. If they took the opinion of the South Metropolitan Gas Company as of any interest, they found that this Company had permanently abandoned the idea of vertical retorts. They were about to greatly extend their horizontal system, and had ordered additional Arrol-Foulis charging machines, showing that they had made up their mind to stick to horizontals. In his own case, he had looked into the question very carefully. He got about 11,000 cubic feet of gas from the ordinary splint which Scotland supplied. There was no doubt they had a difficulty in Scotland with regard to the distillation of coal. It was proved now to be of great advantage to push the coke out. It was well known by those who made and sold discharging machines that in Scotland the coke was soft and entirely different from that which was made from the bulk of English coals, which were more of a caking character, and adhered together—a sort of conglomerate, and was easily pushed out. In the case of Scotch coals, the coke was very soft; and if they attempted to push it out with a ram, they ran the risk of bursting the retort. No doubt, the difficulty might be reduced by the adoption of vertical retorts; and he supposed it was a question of this and of the reduction of space and labour. These were all considerations to take into account; and no doubt within the next year or two the matter would be finally settled as to which was the best. Every man must judge for himself—much depending on the locality—as to what would be the best thing for him to do. If space were of great value, he might adopt vertical retorts, and perhaps do fairly well with Scottish coal; but he thought that where space was not of much account, the extra cost of distillation by the vertical system would certainly be against it. No doubt it had many advantages. If they diminished the space for radiant heat in a retort, over the top of the fuel, the gas would suffer less deterioration. He had always pointed out to those who would insist upon having a through retort, with an ascension pipe at one end, that they would be bound to suffer considerably in the gas. If they were making gas of (say) 26 candles, as they had been doing in Scotland, he found that 1½ candles was lost by taking the gas over the top of the coal to the other end of the retort. These were important matters to consider. However, the standard having been reduced, this loss had also been reduced, because as they went down in the quality of the gas it did not take effect so readily as in a richer quality.

Professor T. GRAY, of the Technical College, said one point which had struck him was that it was a very curious fact that it had taken so long for the coal-gas industry to adopt the vertical retort. It seemed to him that the best results must be obtained from a system of continuous distillation, because all the parts would remain pretty much under the same condition. With an intermittent system it would be quite different. He was impressed with the great similarity there was between the vertical retorts and those which were at present used for the distillation of shale. One point of difference seemed to be that the temperature in the coal-retort was higher, if anything, at the top than at the bottom; whereas exactly the reverse obtained in the case of shale distillation. In shale distillation, the aim was to have the temperature very high at the bottom of the retort and comparatively low at the top, because a low temperature was necessary to prevent decomposition of the gases. There was this further difference, that the gas produced in shale distillation was only of value as a source of heat. There were several points which required to be looked into very carefully—such as the nature of the gas obtained, the nature of the coal tar, and of the coke. With regard to the quality and yield of the gas, it struck him as rather peculiar that in an inclined or vertical retort a larger yield of gas was obtained, and that at the same time the coal tar was more fluid. He should have expected that if they got a lower yield of gas, the coal tar would be less fluid. A yield of 13,400 cubic feet was exceedingly high; and if the gas had an illuminating power at all equal to the gas made in a horizontal retort, it did not seem to him to be obtainable except at the expense of the tar. On the other hand, he should imagine that tar obtained in a vertical retort should be more fluid. He should therefore like Mr. O'Connor to explain these two apparent difficulties.

Mr. WILLIAM KEY (Glasgow) said the trend of modern gas engineering effort leant towards the production of the greatest volume of gas by vertical retorts, and on the smallest possible space. The lecturer had given them an enormous amount of matter of great importance to the gas and chemical industries, and had shown and described many photographs and drawings illustrating his subject. He (Mr. Key) had never witnessed so extensive a production carried through in so small a space of time. The trend of present-day designs for retort charging and drawing aimed, among other things, at the improvement of the working conditions of the furnace stoker and retort charger. The old method of working horizontal retorts at high heats had been faithfully represented on one or two of the photographs exhibited—showing stokers entirely enveloped in flame and smoke. He had himself gone through this fire of experience, both on day and night shifts. The conditions were much worse when the bottom of a retort fell out and they had to make it good again by filling up the hole with coke and carefully building in a new bottom with bricks. Of the numerous methods for the construction and working of vertical retorts shown by the author, the one designed by the speaker some 18 or 20 years ago was not among them. The remarks of Mr. Vass, on the use of small coals in the Woodall and

Duckham vertical retorts, reminded him of his own design, in which he was to utilize small and dross coals. The dross after passing through the rollers became coal dust. A cast-iron trough extended the whole length of the setting, with a depressed portion opposite each retort, which might be to the right or the left; and a plate and chain belt continually brought the coal dust along the trough, thus keeping the pockets filled. A revolving shaft extended along the bench operating cams at each retort, which caused an oblong plunger to push the coal dust from the pocket into an enclosed oblong cast-iron box extending into the retort, and from which the dust fell on to a tapered spreader, and thence into the 20 feet deep empty white-hot retort. For 3 or 4 feet only were the coke and refuse allowed to accumulate within it above the water line; and this was removed by a slow continuously moving Archimedean screw. His intention was to push 1 lb. of coal dust into each retort every five seconds. Any retort could instantly be put out of action by lifting up and throwing back a jointed connection with a cam; and as easily restarted by throwing it forward. He placed this design in the hands of a Patent Agent (the late Mr. Hunt, of Glasgow), whose health was impaired and entirely broken down about this time. His death decided him (Mr. Key) not to proceed further with his application, as he was then about to enter on another and different sphere of business.

Mr. R. Hamilton (Glengarnock) asked if there was any difference in the yield of ammonia with a vertical retort as compared with a horizontal retort.

Mr. J. Robertson (Bedlay) asked Mr. O'Connor whether he was aware of difficulty having been experienced in the matter of the descending of the charge in a vertical retort. He had had difficulty with this.

Dr. G. B. Neave (Glasgow), the Hon. Secretary, read an extract from a letter which had been received from Mr. Glover, of St. Helens, in which he described the working of the vertical retorts there, and went on to say that the lifetime of the retorts would be a long one, and the coal carbonized greater than with horizontal, inclined, or German retorts. Mr. Glover considered that this development had come into the gas industry at the right time, as it would help to cheapen the production of coal gas, and improve the lot of the stoker.

The President remarked that Mr. O'Connor had dealt with the subject more from an engineering point of view than from that of the chemist; but it would be interesting to know the difference in the value of tar produced by the continuous as against intermittent feeding. To an outsider, it seemed a very rational process to have a continuous feed and a continuous discharge, not only with reference to the comfort of the men, but there should be a great saving in heating, and greater regularity in the quality of the output. There had been a good deal of talk about improving the quality of the coke made in gas-works, in order to give a flameless fuel for houses. He supposed a gas-works manager might either be a gas maker or a chemical manufacturer, or he might be a benefactor, to supply them with the best fuel. He supposed that all this was represented in the balance-sheet at the end of the year, and that it would depend very much upon circumstances as to what extent he could improve the selling price of coke, by reducing the temperature of carbonization, or, on the other hand, how much more he could get for his gas by making the largest amount possible. There was, of course, a third point—viz., how much he could improve the value of the bye-products, by varying or decreasing the temperature of distillation. To an outsider, it would seem rather like a rational process to have the highest temperature brought well down from the top—to the middle, or below the middle—and to have steam injected through the hot coke (the first distillation taking place at the top), and then, when the hot coke sank, it would meet with steam, and water gas would be produced. Mr. O'Connor said it would reduce the candle power of the gas; but incandescent gas lighting had so very largely taken the place of the ordinary burner, and gas was being so extensively used for heating purposes, that it seemed to him that illuminating power at the old figure was not so important as it used to be.

Mr. O'Connor, in closing the discussion, said that at Musselburgh there was a sample of a vertical retort which had not been in use for many years. A piece of the vertical retort was still lying in the Manager's garden there; but he was satisfied it had not been in use for thirty or forty years. They would thus see that the idea of vertical retorts was, at all events, as old as that. As Mr. M'Leod mentioned, there was an enormous advantage in the vertical retort where the ground space was limited; but he believed that the extra amount of gas that could be obtained on a certain space by these means was only possible at somewhat heavy cost. He heard recently of an estimate for a setting of vertical retorts, which came out at something like four or five times the price of a horizontal setting for the same quantity; and therefore it might be possible to buy an increased amount of gas at too high a price if vertical retorts were to be so expensive. The tapering of a vertical retort was only obtainable by either building up in rings, each ring being made of the proper taper, or else by building it up with special bricks, or, as in the proposal of Mr. Herring, building it up square with ordinary patent bricks, with grooves only to prevent the gas escaping, by which the cost of the settings would be considerably less. No doubt there would be great difficulty with Scotch coal in trying to push it out at one end—the coke being so very soft. As to the South Metropolitan Gas Company and stoking machinery, he knew it was Mr. Carpenter who first suggested the complete filling of a horizontal retort. This was really utilizing what might be called a chamber setting, with a completely filled retort; and in this way he might not so readily take up the vertical retort, which would require more experiments and tests before it could be regarded as quite satisfactory. In vertical coal retorts there was one particular point which had to be thought of—that was to get the heat out of the coke as much as possible before it left the retort, because it was almost impossible to arrange for the taking of the hot coke from the bottom of the retort and putting it into the producer. His opinion was that the increased quantity of gas came from the reduced quality. It was simply spreading the hydrocarbons over a larger quantity of carrying power. The matter of the tar was, he thought, largely due to the fact that the gas had to pass up through partially carbonized coal, which kept it from becoming of a hard, pitchy nature, and also prevented a great quantity of very fine dust from passing away with it, which would increase the quantity of the carbon and the quality of the pitch. Mr. Key's description of a vertical system was very interesting. In a presidential address which he read to the Society of Engineers seven or eight years ago, he advocated a somewhat similar system; but his idea was to use a 45° retort, and not a vertical one. He suggested the pouring in of small quantities of powdered coal, and allowing it to run down the sides of a fairly steep retort, becoming coked on the way—of course, removing the coke from time to time. He did not think that anybody ever tried it—it was only a suggestion; but it came back to him directly he heard Mr. Key's remarks. Inquiry had been made as to the yield of ammonia. He did not read all the figures he had in the tables in his paper. For instance, with the Glover-West verticals the yield of ammonia was 28·1 gallons of 10 oz. liquor per ton. A considerable increase of ammonia was claimed with the Dessau retorts; and in the chamber retorts there was as much as from 15 to 17 per cent. increased yield of ammonia, as compared with the same coal used in ordinary horizontal retorts. He had not yet seen any results of tests which had been made as to the temperature at the various heights in the retorts. As soon as Mr. Herring got his retorts into use—they were at present red hot—he proposed to carry out a number of tests, to see what temperatures he would get at the various parts of the retort throughout the charge, and also, by having the greatest heat at the top, the middle, or the bottom, and trying in every possible way to see how the best results were to be obtained. The installation he was putting down was simply an experimental setting. He did not expect that the settings to be afterwards put up would be anything like these. He gave some figures as to the work at Sunderland, where steam was employed; but in Scotland, where Parliament insisted upon a certain candle power, a large quantity of steam could not be used, as it would reduce the candle power. In Scotland, the increased yield of gas per ton would only be about 450 cubic feet, and the illuminating power would fall about three-quarters of a candle; so that there did not appear to be great advantage in steaming when the gas was required to be of a high illuminating power. In Germany, with the Dessau vertical retorts, steaming was practically used on every occasion. At every charge steam was put in; and the illuminating power was about 11 or 12 candles. It was with reference to the Woodall-Duckham process that he mentioned that, although they had anticipated that steam might be introduced, they themselves had not found it advantageous to do so. In reducing the candle power, the great point was not to lower the calorific value; and to attain this, the aim of gas manufacturers just now ought to be not to manufacture hydrogen but methane. If they were making water gas, they would be manufacturing carbon monoxide, which was not so valuable for heating purposes as hydrogen. So that the mixing of water gas with coal gas was likely to have a tendency to reduce the calorific power, which, however, was what they wanted to retain, for the purposes of heating, of lighting, and of cooking.

On the call of the President, a very hearty vote of thanks was awarded to Mr. O'Connor for his interesting communication.

It will be seen, from an announcement which appears elsewhere, that the Directors of the Bournemouth Gas and Water Company are inviting tenders for 2019 £10 "B" shares (7 per cent.). The minimum price of issue is £15 per share; and tenders are to be sent in not later than the 17th inst.

In another part of the "Journal" will be found the prospectus of the Trinidad Oilfields, Limited—a Company which has been formed with a capital of £300,000, in £1 shares, to acquire from the Trinidad Petroleum Company, Limited, their oil and other mineral rights in and over lands situated in the Guapo and La Brea districts in the Island of Trinidad, aggregating 3791 acres. Of these, 3200 acres are Crown lands; and the vendors have obtained from the Trinidad Government a lease of the crude oil, bituminous minerals (including asphalt), and natural gas in them, for a term of 21 years from July 1, 1909, with the right of renewal for a further similar period. The vendors have also acquired the oil and mineral rights in two other estates to be transferred to the purchasing Company. The price to be paid is £153,000, of which £68,000 is to be in cash and the remainder (£85,000) in fully-paid shares. The Company are making an issue of 260,000 shares, and they invite applications for 175,000 of them—the minimum on which the Directors (one of whom is Mr. Corbet Woodall) may proceed to allotment. The subscription list opened yesterday and will close to-morrow.

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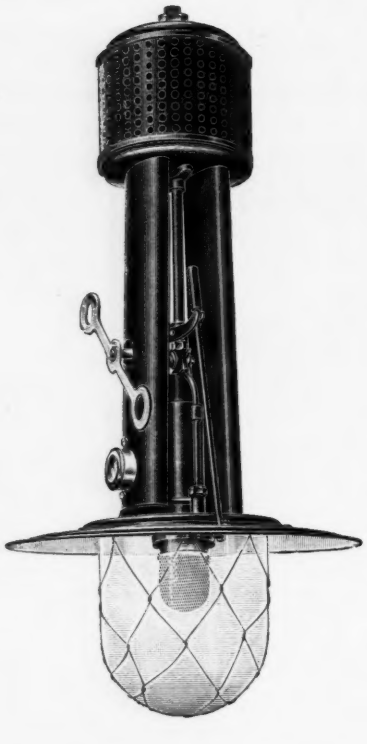

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LONDON AND SOUTHERN JUNIOR ASSOCIATION.

Last Friday's meeting of the London and Southern District Junior Gas Association—which took place at the Cripplegate Institute, Golden Lane, E.C.—was of a highly interesting nature, including, as it did, many practical demonstrations, and a paper which dealt fully with the subject of "Incandescent Mantles, with Special Reference to the Use of Non-Collodionized Mantles." The chair was occupied by Mr. W. J. LIBERTY, the President; and there was a gratifying attendance of members. No doubt additional interest was imparted to the proceedings by the fact that the members of the Association so recently visited the works at Wandsworth of the Voelker Lighting Corporation, where they were enabled to see the entire process of manufacture of collodionized mantles—a brief description of which was given in the "JOURNAL" for the 15th ult., p. 434.

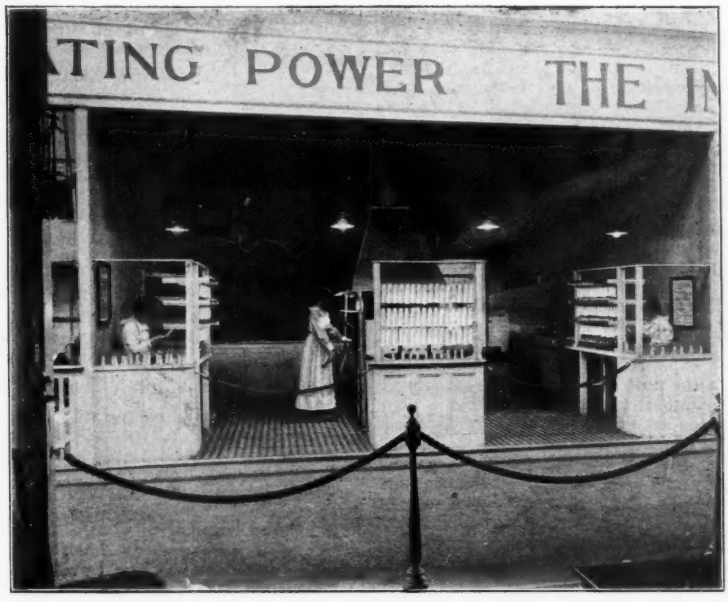
Mr. PERCY G. SOMERVILLE, a member of the Chief Inspector's Department of the Gaslight and Coke Company, was the author of the paper, which was divided into four parts. The first part consisted of a brief history of the incandescent mantle; the second dealt with the manufacture of the collodionized mantle; the third, with the non-collodionized mantle; the fourth, with the comparative advantages of the collodionized and the non-collodionized mantle. With the subject-matter of the first two parts, most of those interested in the gas industry are already fairly familiar; and we may therefore pass them over with the remark that the author dealt with them in an able manner, and in such a way that the attention of his audience was not for a single moment relaxed. Mr. Somerville's remarks on the third and fourth parts of his paper were as follows.

THE NON-COLLODIONIZED MANTLE.

The system of using non-collodionized mantles was first introduced into this country about six years ago by Mr. Corbet Woodall, then a Director, and now, as you all know, the Governor of the Gaslight and Coke Company. It was at Mr. Woodall's suggestion that this system, which had been widely adopted on the Continent, was investigated, and subsequently brought into operation by Mr. Goodenough, with whose permission I am able to put before you this evening some particulars respecting its operation.

It may be advisable to mention, first, that the difference between mantles treated under this system and collodionized mantles as usually purchased, is that the latter have been dipped into a solution of collodion (or gun-cotton), which is done simply for the purpose of enabling the mantles to be handled and transported freely without any damage. This coating of collodion has, as you know, to be flared off when the mantles are first put upon the burners. Under the system now being considered, the mantles are bought in the limp stocking condition. They are afterwards modelled over a wooden shaping-cone, and placed on a rack in front of the modeller. This rack, when it is full, holds sixteen stockings. It is an essential point that the operator who performs the work of modelling should have cool hands; otherwise the heat of the hand will absorb to a certain extent a portion of the metallic oxides which are contained in the stocking.

The stocking is then fired, and the ramie fibre burnt out, leaving only a skeleton of the ash, consisting of the thoria and ceria



Mantle Burning-Off Exhibit at the Franco-British Exhibition.

which constitute the essential portion of the mantle. Each mantle is then partially hardened and shaped by means of a single bunsen burner, before placing it on the seasoning machine. The reason of this is that if the stockings were placed direct on the machine, fired, and allowed to cool, the natural shrinking that takes place in the burning-out of the fibre would prevent the operator getting the seasoning burners up the mantles, as they are then in such a fragile condition that the least touch at this stage would be fatal to the mantle; whereas by using a single burner first, away from the machine, the operator is able to manipulate each mantle, and thus get it open by means of the gas pressure from the bunsen burner.

After the operator has carefully done this part of the work, the rack containing sixteen mantles is placed on the machine; the mantles being then the proper shape, thus allowing the burners to go straight up the centre, without touching them in any way. They are then seasoned and hardened for an average of four minutes by means of bunsen burners, working at a pressure varying from 50 to 100 inches of water (the pressure being governed entirely by the quality of the stocking being burnt off). You will no doubt be surprised to hear that the mantles at this stage are practically as firm as ordinary collodionized mantles, with the exception that they have not, of course, the elasticity which the collodion imparts.

This process being finished, they are trimmed either on a "C" or No. 4 burner-head, a piece of cotton is tied carefully on the loop, and they are next labelled and boxed in glass cylinders ready for transit, in this non-collodionized, and therefore rather more fragile, condition. They are then taken by the public lamp or ordinary maintenance men, carried about with a reasonable amount of care, and placed on burners either in the street-lamps or in the consumers' premises as required. Not more than 2 per cent. of the mantles so carried are broken in transit. There are many reasons for packing the non-collodionized mantles in glass tubes, instead of cardboard. The men using them can at once see whether the mantle is perfect; and as they are handling glass, they naturally exercise greater care. It has also been found by experience that the inside surface of cardboard tubes is generally rough; and if a mantle in being extracted should accidentally come in contact with this rough surface, it would at once be rendered useless.

The clear glass tube also acts as a splendid check on the work of the hands, as it prevents anyone from packing mantles with the slightest defect. The labels which the packers and trimmers use have their initial on; so that in the event of any carelessness occurring, it is quite an easy matter to trace the girl responsible. It is therefore obvious that, after taking the many advantages into consideration, the glass tubes well pay for the initial expenditure, as they are capable of being used over and over again, and, provided ordinary care is exercised by the operators, should have a very long life. To ensure the non-collodionized mantles being up to their standard of efficiency, they are tested weekly both for illuminating power and durability, and are generally found to stand, without appreciable damage, 1000 shocks on the Woodall-Moon shocking-machine.

No doubt many of you saw the burning-off process being carried out in a portion of the exhibit arranged by the Gas Undertakings of the United Kingdom at the Franco-British Exhibition, and in respect of which a Gold Medal was awarded. This exhibit proved to be of great interest to the public generally, but was more especially appreciated by the numerous gas managers, and other officials from almost all parts of the world, who visited the

Exhibition—the majority of them going out of their way to show their appreciation by making exhaustive inquiries.

This brings me to the chief part of the paper—namely, that which refers to the advantages obtained by a gas undertaking, in using non-collodionized mantles in place of collodionized, for maintenance purposes. Speaking generally, the first and most important point when considering the advantage of one system over another, is cost; so I will deal with this first of all.

The average difference in the cost of collodionized mantles and the mantle stocking is 4s. 6d. per gross. Out of this 4s. 6d., the cost of turning the impregnated stocking into a finished non-collodionized mantle has to be deducted; but even when taking this into consideration, there is still an appreciable margin of economy which averages about 3s. per gross. When this is multiplied by the enormous quantity of mantles that are used by many companies in the course of a year, it is seen to be an item of no mean importance, but well worth serious consideration. It is not, however, only in the actual saving in cost of the two articles that the advantage of the non-collodionized system lies. The Gaslight and Coke Company have found, after long experience and a large number of exhaustive tests, that the general usage of mantles per burner per annum averages considerably less when non-collodionized mantles are adopted—resulting in their employing this particular kind of mantle on every possible occasion. This is clear evidence of their belief in its undoubted superiority.

The last and one of the most important points in favour of the non-collodionized mantles is that, by adopting them, one is absolutely certain of having a mantle as near perfection as it is at present possible to get. This cannot be said definitely when using collodionized mantles, as it is a very difficult matter indeed to tell whether a collodionized mantle is sound or not, until the collodion is flared off; and then it is too late. That such defective mantles do get on the market, is accounted for by the fact that in every incandescent mantle factory, at the end of the day's work, they have a certain proportion of mantles which are in some way or other defective. These are called in the factory "throw-outs," or "seconds," and are put on the market and sold as second quality mantles; so that the majority of cheap mantles constantly seen on the market (sold at 1½d. and 2d. each) are either factory throw-outs or else single-thread mantles which have little or no life, and are therefore as big an enemy to the gas industry as the flat-flame burner.

A pinhole defect in a mantle, when collodionized, is hardly visible to the eye, except on very close scrutiny, which is not likely to be given in daily practical use; so that it is obvious that the collodion to a mantle acts like an overcoat to a man—it may cover a multitude of threadbare spots. This drawback is safeguarded against by the use of very carefully inspected non-collodionized mantles, for reasons already explained.

The difference in illuminating power between the collodionized and the non-collodionized mantle is not marked, but at the same time is in favour of the latter system, which is, as a rule, about 1-candle power per cubic foot to the good.

To give an idea of the staff required to burn-off and finish a given quantity of mantles, I would mention that the Gaslight and Coke Company are at the present time burning-off 10,000 mantles per week (520,000 a year) with a staff of seven girls, including the forewoman and packers. An operator can burn-off and model 300 mantles per day of 9 hours, which is ample time to allow of the work being done thoroughly. The cost of fitting up the necessary plant depends entirely on the quantity of mantles required to be burnt-off; but it is not a serious matter.

At the conclusion of the paper, the author gave practical demonstrations on many of the points to which he had referred. He showed the operation of burning-off and seasoning and hardening uncollodionized mantles; and he also exhibited samples of defective inverted collodionized mantles, the defects in which became evident as soon as the mantles were burnt-off, as well as a single-ply upright mantle, which began to break away immediately after lighting-up. Great interest was taken in the manipulation of the No. 4 Kempton special striped uncollodionized mantle, which is chiefly used in the City, and is strengthened so as to withstand the vibration of the heavy traffic. A number of lantern slides showing the microscopic structure of the mantle were thrown on the screen; and members were subsequently able to make further examinations under a microscope which Mr. Henry Austin had thoughtfully sent to the meeting.

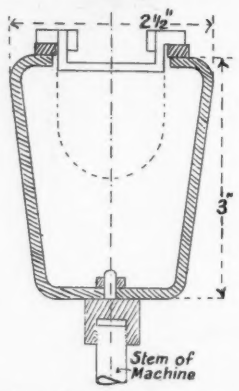
Discussion.

The Hon. Secretary (Mr. S. A. Carpenter) remarked that when non-collodionized mantles were purchased, they were rolled up; and on being burnt-off without any of the apparatus which had been described, they were apt to shape-up rather badly—especially the inverted forms—and one did not get anything like the light obtainable with the ordinary collodionized mantle.

Mr. Wedd said he would like some further information on the comparative values of silk and ramie. Another question he had often asked, but without getting a satisfactory answer, was whether China grass was the same thing as jute. He had heard that it was; but the texture did not seem the same.

Mr. D. W. Winslow thought Mr. Carpenter's point was a most interesting one, as it showed that a special department was necessary for the burning-off, &c., when gas companies adopted non-collodionized mantles. On the question of cost, if the saving was what the author calculated it at, it looked as if there was money in the matter. Did Mr. Somerville get a proportionate number of throw-outs; and did he ever reject any soft mantles as received from the makers, or was it subsequently that the defects appeared?

Mr. J. G. Clark remarked on the importance of testing the mantles. They had heard the large number that the Gaslight and Coke Company used, and consequently could see how necessary it was to keep a very close check upon the quality. The tests that were needed to settle the question of whether a mantle was good or not were really three in number. First came the durability test. A mantle was run for a number of hours, during which time it would show whether any pin-holes existed or shrinkage took place. The photometer test would follow; and this was perhaps best carried out after the mantle had been burning (say) 50 to 100 hours. Of course, in special cases a longer period of burning was resorted to; but the time he had mentioned they found to be a very good average. The third test was that of shocking, which could conveniently follow the photometer test. Referring to the Woodall-Moon shocking-machine, it should be noted that there were two or three points that must be attended to, if really good results were to be assured. One of these was the proper lubrication of the hammers by means of which the shocks were delivered. They must be carefully lubricated where they passed through the casting. It was a seemingly small detail; but it made all the difference between a scientific and an unscientific test. Then, again, it was better to use always the same burner. Different burners would vary in the niceness of their fit on to the head; and if the same one was kept to, strictly comparable results would be secured. With reference to the shocking of inverted mantles, the arrangement generally adopted, so far as he was aware, was to have an ordinary swan-neck fitting; and the arm would act to a large extent as an anti-vibrator. Therefore one did not get anything like the full shock of the impact at the mantle. The accompanying sketch would explain a device he had adopted for the purpose, as the result of his own experience. Briefly explained,



Fitting for Testing Inverted Mantles on the Woodall-Moon Shocker.

the arrangement consisted of a frame of stiff brass, having at the top a plate pierced with a hole. The mantle was suspended in the top plate, and was held by rubber bands. In this way, a very effective shock test could be brought about.

Mr. Somerville, before replying on the discussion, asked Mr. Carpenter to make his point a little clearer.

Mr. Carpenter said the Gaslight and Coke Company had special apparatus for shaping the mantles, and by this means they secured excellent results. If, however, they procured the rolled-up soft mantles, and used them apart from this special apparatus, would the same good results be obtained? His own experience was that they did not shape-up well. The system that had been described could, of course, only be applied to a company large enough to have its own staff.

Mr. Somerville remarked that he had not had much experience as regarded Plaissetty mantles. With the system he had described they could, if desired, have only one machine with two girls doing the whole of the work. It depended entirely upon the number of mantles it was desired to turn out.

Mr. Carpenter: Small companies would not, however, even require that.

Mr. Somerville (continuing) referred to the question of knitting and weaving, which he said was simply a matter of expense. Although a vast number of the stockings manufactured at present were knitted, there were, at the same time, a good proportion of woven stockings on the market. The woven stocking was far superior, because it possessed greater strength, and also because there was less likelihood of stitches being dropped. The cost of production was naturally greater, on account of additional labour and more expensive machinery being necessary; but when the manufacturers were in a position to supply these stockings at a reasonable figure, it was certain they would ultimately supersede the knitted stocking. As to the difference between silk and ramie mantles, he was not in a position to say much. The only artificial silk mantle he had personally had to deal with was the "Cerofirm." Mr. Winslow had alluded to the difference in cost between collodionized and uncollodionized mantles. He (the speaker) figured it out at 3s. a gross; and this was a very fair average to strike. The figure could not, of course, be taken as

strictly applicable to other cases, because it was governed by the number of mantles that had to be burnt-off. The average cost to the Company of burning-off was about 1s. 4d. a gross, to which had to be added the cost of the stocking. On the other side, there was not only the cost of putting through collodion, in which the breakages were pretty high, but also profit. When a gas company took up non-collodionized mantles, they were really doing a part of the manufacturer's work, because they were using a mantle which was not in a saleable condition. Of course, they did get breakages, but practically nothing to speak of.

Mr. EDE alluded to the weight of mantles; saying that he had found various mantles had different weights—there was a varying amount of ash of thorium and cerium left after burning-off. It was not always the mantles which had weighed the heaviest that had been the best.

Mr. WINSLOW, on this point, remarked that the best Graetzin inverted mantles were of a very fine mesh; and they had been found to last materially longer than the ordinary thicker mantle, which had a tendency to break away round the ring. It would appear from this that the extra weight proved too great a strain upon this portion of the mantle.

Mr. SOMERVILLE said, referring to upright lighting, that it had not been his experience that the thicker mantle had a shorter life. In fact, it was rather the other way about. Of course, a mantle could be made at any price that was desired—everything depended upon the weight of the metals in the mantle, and the quality of the yarn used. The mantles of to-day nearly all consisted of 99 per cent. of thorium and 1 per cent. of cerium.

Mr. WEDD said he had carried non-collodionized burnt-off mantles 30 miles, through five changes of railway carriages, and had had no trouble. He had also sent them to friends, who had been better pleased with them than with the collodionized kind. If the gas companies could take the matter up and burn-off the mantles, he did not see why they should not be sold in that condition. The mantles he had spoken of had been packed in cardboard boxes; and he had never had a breakage.

Mr. SOMERVILLE: All I can say is you are very fortunate. We do not get many breakages; but we have a special case for carrying these mantles fitted with drawers which are partitioned to exactly fit the glass tubes, and which hold about 300 mantles. This box is suspended from strong spiral springs in a frame which stands on the floor of an ordinary one-horse van. The springs absorb all shocks and vibration; and we are thus enabled to take about 1800 mantles at a time to any of the district offices.

Mr. WINSLOW proposed, and Mr. E. SCEARS seconded, a hearty vote of thanks to Mr. Somerville for his paper.

Mr. L. F. TOOTH, in supporting the motion, said he thought the general use of the more heavily impregnated mantles, and what had been described as two-ply, three-ply, and striped mantles, was because they had longer life. Of course, gas was consumed at much higher pressures than formerly. A few years ago, they could not have used these specially strengthened striped mantles.

The vote having been carried with applause,

Mr. SOMERVILLE acknowledged it, and expressed his thanks to Professor Vivian B. Lewes for placing at disposal his valuable notes on "The Theory of the Incandescent Mantle," and for the loan of the lantern slides showing the microscopic structure of the mantle. This information had been exceptionally interesting, and had also greatly enhanced the practical value of the paper. It was encouraging to members to know that they had patrons like Professor Lewes, only too willing to assist them.

COMING EVENTS.

The PRESIDENT said that two new members had to be announced: Mr. J. H. Donaldson, Assistant Engineer and Secretary of the Tonbridge Gas Company, and Mr. George E. Palmer, of the Harwood Terrace branch of the Gaslight and Coke Company. The next visit would be on the 12th inst., to the Hornsey Gas-Works; but previous to this there was the annual dinner, to take place next Saturday, when the delegates from the other Junior Associations would be present. On March 18, there would be the lecture by Dr. Harold G. Colman; and on this occasion it had been decided to meet at 7 o'clock, and hold a sort of informal reception previous to the business meeting, which would begin at 8 o'clock. The subject Dr. Colman had fixed upon was gaseous combustion and some of its applications; the plan adopted being first to discuss flames in general, and the development of flame temperatures, and then to discuss the practical application of the principles, on the one hand to the heating of retort-settings, and on the other hand to incandescent gas-burners. When preparing the lecture, however, Dr. Colman found that it would hardly be practicable to compress the whole of the matter into one lecture; the general discussion of flames being sufficient in itself for one lecture. He did not like the idea of giving simply the general side of the subject, without considering its practical bearing in some respects; and rather than cut the first part short, and perhaps make it much less intelligible, he had kindly suggested that he should give two lectures—the second (on the applications) to be delivered perhaps at the close of the present session or the beginning of next. The Council felt deeply indebted to Dr. Colman for his offer, to which they had readily agreed; and they had since heard that the titles of the two lectures would be: (1) "The Development of High Temperatures by Gaseous Combustion;" and (2) "Some Practical Applications of Gaseous Combustion." It had been arranged that the second lecture should be given at the November meeting of the next session.

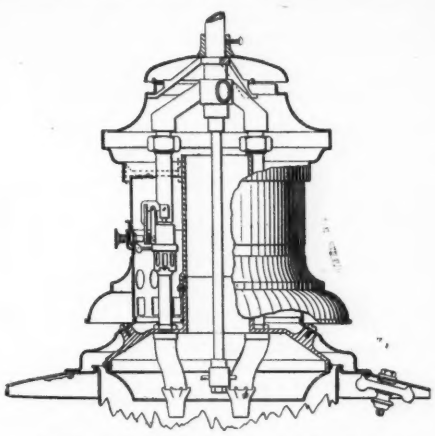
REGISTER OF PATENTS.

Incandescent Gas-Lamp.

HANDS, G., of Farringdon Road, E.C., and BREEDEN, F., of Moseley, Birmingham.

No. 27,775; Dec. 21, 1908.

According to this invention, the cap or bonnet of the lamp is provided (as shown) with a sleeve or boss adapted to surround, and to be pushed up and down on, the gas-supply pipe or other means of suspending the lamp. The sleeve has a set-screw by which the cap may be clamped if desired, either in the normal position or in a raised position, so as to leave the top of the lamp open and permit of gaining access to the interior. Below the cap is a centreing piece—a ring or annulus with radiating arms adapted to hold a surrounding cylindrical sleeve central while the annulus surrounds the chimney. This centreing piece also serves for the cap to rest on; and the latter is somewhat larger in diameter, to allow of the products of combustion escaping.



Hands and Breeden's Incandescent Gas-Lamp.

The lower part is perforated centrally, and is made inverted dish-shaped with projections, so as to leave spaces for the supply of air. Below the cylindrical sleeve is a bottom sleeve (in the form, more or less, of a hollow truncated cone) with a cylindrical part; holes being provided in the cylindrical part and a space being left between the cone and the reflector for the inlet of air to the annular chamber surrounding the chimney, so as to produce the gaseous mixture and promote proper combustion in the lamp. The dished part of the chimney has holes through which the burner-tubes pass; and the base of the chimney has also connected to it a reflecting plate provided with holes to allow the burner-tubes to pass through and permit of the escape up the chimney of the products of combustion. In the case of a cluster of burners, these holes are set close together so as to merge into one large hole, and the burner-tubes are cranked accordingly.

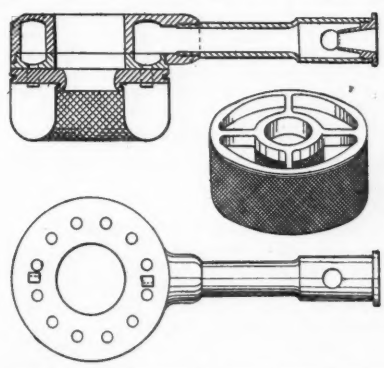
A lamp of this description may be provided with an ordinary bye-pass and a pilot burner or with an additional bye-pass of the flash-light variety.

Burners and Mantles for Incandescent Gas Lighting.

CHATTERTON, J., and COVENTRY, W., of Salford.

No. 3786; Feb. 16, 1909.

This invention comprises "a burner of annular form, with perforations or slits on the underside for the gas to pass through and a gas-inlet at one side to receive a mantle of corresponding annular form;" also "a mantle of trough-shape to fit on to the arms of a flat or straight burner having a number of perforations or slits on the under side."



Chatterton and Coventry's Incandescent Burner.

The illustration shows a sectional elevation of the annular burner and mantle; a plan of the burner from the underside with the mantle removed; and a perspective view of the mantle with its support.

The burner is made of the ordinary bunsen construction with gas-nozzle and air inlets placed in any convenient position, and preferably

with regulators to control the air and gas supply—all of the ordinary construction. The gas inlet-pipe is placed at one side of the burner to prevent the heating of the gas before entering the annular burner. The burner is of annular form, with an opening through the centre and a number of perforations on the under side. Or (instead of perforations) a number of cross slits or an annular slit, with or without a ring of gauze, may be substituted; but at present the perforations are said to give the best results.

The body of the burner, for convenience of construction, is made in two parts—the lower part (carrying perforations) being screwed to the upper part; and, for the purpose of preventing lighting-back or of more thoroughly mixing the air and gas, a ring of gauze may be placed in the interior of the burner above the perforations.

The porcelain mantle support is of annular form with concentric rings to which the edges of the mantle are attached. The mantle is made from a conical blank; the smaller end being attached to the inner ring of the support and the larger end turned up and attached to the outer ring. An annular mantle is thus constructed with a central opening which fits over the ring of perforations in the burner.

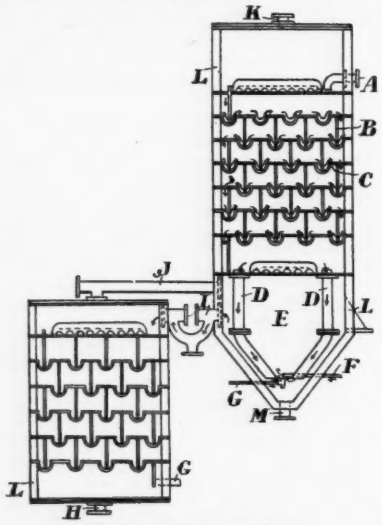
The patentees say they are aware that annular mantles have been applied to certain types of inverted incandescent gas-lights, and make no claim, *per se*, to annular incandescent mantles. They are also aware that circular burners are not new, and that burners with straight arms have been employed with ordinary mantles placed upon them horizontally, and so they make no claim therefor.

Stills for Ammoniacal Liquids.

ANDREWS, W., of Pye Bridge, Alfreton.

No. 3477; Feb. 12, 1909.

The internal arrangements of these stills are "designed to give as long a contact-time as possible, and at the same time to thoroughly agitate the liquor to be distilled." The channels and serrated baffle-plates are so arranged that the liquor is "more evenly split up by the steam, which takes out the compound to be distilled much better and with more economy." The liming chamber is so designed that the liquor, on entering, comes into immediate contact with the steam and lime—"thus ensuring all being uniformly mixed before entering the secondary still." The steam inlet is so arranged that it "prevents the outlet valve becoming choked with sediment owing to the thorough agitation of the liquids at this point." The stills are so designed that, in case of cleaning out, by taking down one side of the still the whole of the channels and baffle-plates can be readily cleaned.



Andrews' Ammonia-Still.

A is the liquor inlet to the primary still; B are baffle-plates; and C, the channels referred to above. The pipes D convey the liquor to the mixing or liming chamber E. F is the lime inlet, and G the steam inlets. H is the waste spent liquor outlet from the secondary still. I is the overflow from the mixing-chamber to secondary still; and J is the gas-pipe from secondary still to the primary still. K is the outlet for the ammonia or other gases. L is where the liquor gauges are placed. M is the outlet for the waste spent lime.

Gas-Regulator for Bunsen Burners.

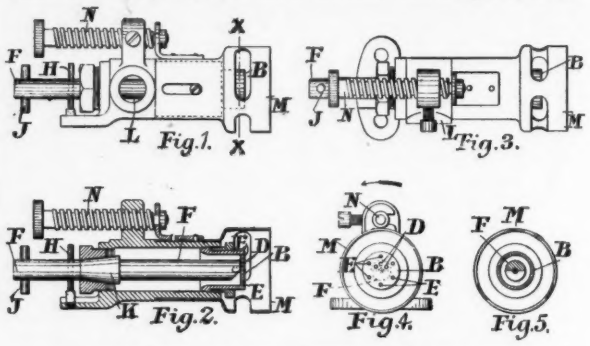
ROSE, A., BELLAMY, W., and YATES, H. J., of Birmingham.

No. 5499; March 8, 1909.

This invention relates to regulators as employed with bunsen or atmospheric gas-burners for heating and lighting purposes, and has for its object "to construct an improved regulator of the type in which a number of apertures can be opened or closed, successively or individually, to increase or diminish the gas supply."

Fig. 1 is a side elevation, and fig. 2 a longitudinal section, of the regulator. Fig. 3 is a plan. Figs. 4 and 5 are a front elevation and transverse section on the line X of fig. 1.

In carrying the invention into effect, the body of the regulator is fitted with a detachable nozzle B held in position by a gland. In the end face of the nozzle are formed a series of apertures D. There is also provided a ring of other apertures E, which determine the amount of the minimum gas supply. The maximum supply is obtained when both sets of apertures are open. In conjunction with the apertures D is mounted a regulator stem F, which passes axially through the regulator body and projects beyond the rear end of the latter. The stem abuts against the inner face of the nozzle, and while covering the apertures D does not interfere with the apertures E. To enable the former to be successively opened or closed, the adjacent extremity of the stem is cut away along one side of a diametral line, so that in one limit the apertures are completely open and in the other limit completely closed.



Rose, Bellamy, and Yates' Bunsen Burner Regulators.

Rotation of the stem between these limits causes the apertures to be successively or individually cut out or brought into operation. With a stem as shown, a movement of approximately half-a-revolution is required to completely open or close the apertures D. Figs. 2 and 4 show the apertures closed. Rotation in the direction of the arrow (fig. 4) causes the apertures to be gradually opened one after another until about half-a-revolution has been completed, when the apertures are fully open.

For limiting the motion of the stem F, a transverse pin H is arranged for abutment against either side of a stop; and a similar pin J (or a knob) enables the stem to be rotated. To prevent the escape of gas, the stem is preferably formed with a conical shoulder K—an arrangement which also serves for taking up any endwise freedom of the stem and for maintaining the latter in close contact with the inner face of the nozzle. Gas is admitted to the body part through a branch or inlet L.

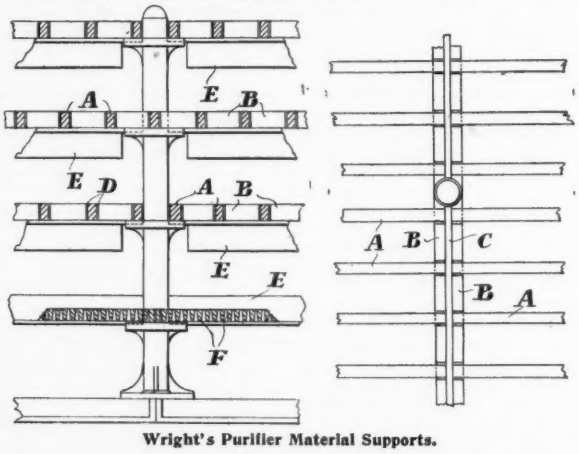
With the regulator described may also be provided any suitable air-regulator. In the arrangement shown, the air-regulator is in the form of a sleeve M adjusted by a screw N.

Supporting Oxide in Gas-Purifiers.

WRIGHT, J. C., of the West Ham Gas-Works.

No. 11,058; May 10, 1909.

This support or grid for use in gas purification comprises, in combination, a series of bars loosely fitting in slots formed by, or in distance-pieces connected to, suitable timbering adapted to rest on the existing T-iron bearers or bars of the purifier box.



Wright's Purifier Material Supports.

As shown in the sectional elevation of a series of grids, and a plan view taken at right angles, A represents battens and B distance-pieces secured to, or formed in one with, a quartering or other suitable timber C, in such a manner as to leave slots D for the reception of the ends of the battens, which, with the distance-pieces, are carried by the existing T-iron bearers or bars E. By using such a support or grid as that shown, the area of the openings for the passage of gas is considerable—a result "unobtainable" with the construction of grid F shown in the lower tier, which represents a grid as at present in use. By having the bars loosely fitting in the slots D and supported by the existing T-iron bars E, as in the present invention, it "becomes an easy matter to clear out the oxide without destroying the timber or bars, which can be used again."

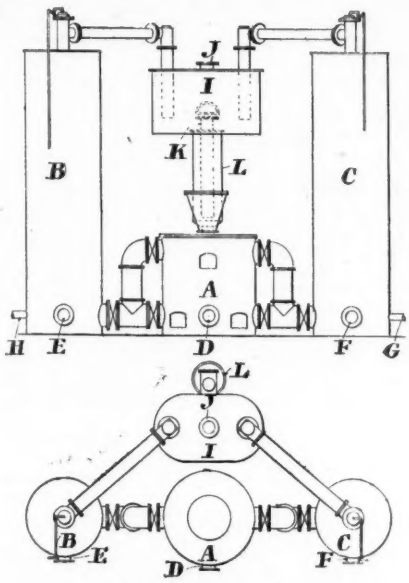
Purifying Gas.

HALL, E. L., of Portland, Oregon, U.S.A.

No. 14,200; June 17, 1909. Date claimed under International Convention, July 11, 1908.

This invention has for its object "to remove from gas, after it has been purified as much as possible by hitherto known methods, the organic compounds of sulphur which remain therein and which hitherto

have been considered unremovable." Concerning it, the patentee remarks: Illuminating gas, and especially that made from the crude oils of the Pacific Coast, contains, when first manufactured, organic sulphur in the form of carbon bisulphide and inorganic sulphur in the form of sulphuretted hydrogen. Heretofore but little difficulty has been experienced in removing the sulphuretted hydrogen, by passing the gas through a body of lime or oxide of iron and by other methods—an operation which has no effect on the carbon bisulphide, but leaves it remaining in the gas. The object of the invention is the removal of this carbon bisulphide from gas, by first converting it into sulphuretted hydrogen and then removing the latter by any method heretofore used for the purpose.



Hall's Gas Purifying Process.

A is the generator, and B and C the reheaters similar to ordinary water-gas superheaters, containing loose or chequerwork fire-brick. The generator is provided with a hopper for the continuous supply of fuel, and with cleaning doors and an air inlet D. The generator is connected by means of pipes with both the reheaters. After the reheater B has become sufficiently heated for service, it is cut off from the generator and connected with the reheater C. Gas to be purified is admitted to the reheaters by the inlets E F, and steam is introduced at G H. The reheaters have valves by which they are connected with the stack during the process of heating. They are also connected by pipes with a seal I, which is provided with an outlet J leading to the coolers and purifiers (not shown), and also with a water overflow pipe K leading to an overflow tank L, by means of which the water in the seal is maintained at a proper level.

The generator is operated continuously, and connected alternately with the reheaters. Gas is introduced with steam into one of the reheaters after it has been raised to the proper temperature, and carried to the seal and coolers and purifiers; the generator being meanwhile connected with the other reheater for the purpose of raising its temperature sufficiently to receive gas, when the first reheater has been cooled in service—thus making the operation continuous. The steam, in passing through the chequerwork of the reheater, is decomposed; its hydrogen uniting with the freed sulphur of the gas, producing sulphuretted hydrogen, which is removed from the gas by the succeeding ordinary process of purification.

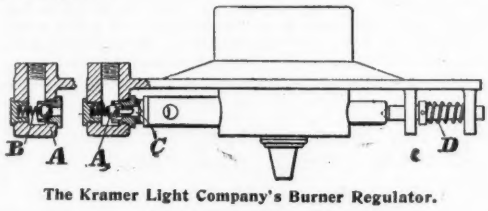
In converting carbon bisulphide and organic sulphides into sulphuretted hydrogen in the manner described, a range of temperature between 400° and 1000° C. may be employed; but in practice, between 400° and 900° is preferred.

Valvular Devices for Incandescent Burners.

NEUE KRAMERLICHT G.M.B.H., of Charlottenburg, Germany.

No. 19,212; Aug. 20, 1909. Date claimed under International Convention, Aug. 26, 1908.

This invention consists, broadly, of an automatic obturating or valvular device arranged in the gas-supply pipe adjacent to the burner nozzle, and adapted to become operative as soon as the nozzle is removed from its seat; while when the nozzle is replaced, the valvular device is re-opened.



The Kramer Light Company's Burner Regulator.

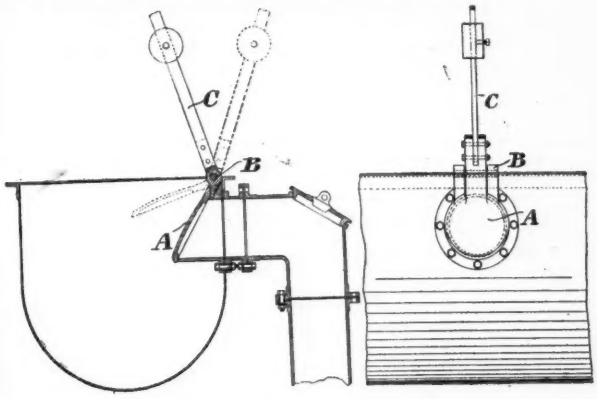
The operation of the device, as illustrated, is as follows: When it is closed, the ball A is tightly pressed by the spring B on to its seat; so that in this position the gas-pipe is closed. When the tubular extension C of the nozzle is inserted in its sleeve, and the mixing-tube fixed by the locking device D, owing to the preponderating force of the spring, the ball is pressed inwards in opposition to the pressure of the spring B—that is to say, lifted from its seat—whereupon the gas flows through the lateral perforations in the sleeve to the nozzle opening. As, however, the spring B permanently holds the ball against the projection C when the mixing-tube is withdrawn, the conduit is re-closed. The arrangement of these springs, acting one against the other, presents the advantage that if the locking means should fail or the mixing-tube be incorrectly inserted, the spring B becomes operative and cuts off the supply of gas to the burner.

Valves for Closing Ascension Pipes.

BEIMANN, W., of Bishop Auckland.

No. 25,043; Oct. 30, 1909.

As the patentee points out, the valve that cuts off communication of the ascension pipe of a gas-retort or coke-oven with the hydraulic main generally slides through a stuffing-box and "becomes very troublesome, not only on account of the friction set up by accumulations of hard pitch or the like on the guiding surfaces and spindles, but because similar accumulations prevent the valve from closing properly." The present invention relates to a valve for closing the ascension pipe, which is contained wholly within the hydraulic main (so that no stuffing-box is required), and turns upon a hinge instead of sliding in guides. "Being continuously exposed to fresh gas on both sides, of sufficiently high temperature to prevent any accumulation of pitch, it keeps comparatively clean, and therefore rests properly on its seating."



Beimann's Hydraulic Main Valve.

The valve A, as shown, is mounted to turn on the pin B, and carries the weighted arm C. As the hinge is cylindrical, the valve can be turned from the closed to the open position from outside the main without loss of gas. The portion of the cover of the hydraulic main which is adjacent to the hinge is slotted to accommodate the latter, and a part is adapted to be slid out when the pin B is to be removed for lifting-out the valve for repairs.

The patentee says he is aware that he is "not the first to close the ascension pipe of a gas-retort or coke-oven by a valve which can be turned without escape of gas on a hinge from outside a main, other than the hydraulic main, within which main the valve is situated," and his invention does not include this feature alone. He claims: "A valve for closing the ascension pipe of a gas-retort or coke-oven which is situated wholly within the hydraulic main and is turned on a hinge from outside the main without permitting escape of gas substantially as described."

APPLICATIONS FOR LETTERS PATENT.

3536.—BRUCE, A., G. M., & A., JUN., "Air-gas plant." Feb. 14.
3548.—LANGFORD, P. N., and SHILTON, W. A., "Fastenings for retort mouthpieces." Feb. 14.
3589.—COPPERSMITH, J., "Joints for pipes." Feb. 14.
3619.—PARKER, C. H., "Gas-producers." Feb. 14.
3648.—NORTH, R. B., and THOMPSON, C. H., "Fluid meters." Feb. 14.
3696.—THOMAS, J., "Incandescent gas-lamps." Feb. 15.
3713.—ROBIN, J. I., "Manufacture of mantles." Feb. 15,
3780.—DRABBLE, H., "Reflecting light and heat produced by a gas-burner." Feb. 16.
3791.—VALENTINE, H. S., "Recovering and utilizing waste heat from gas-fires." Feb. 16.
3822.—WOLF, O., BAMBURY, N. F., and BERNARDY, E., "Brackets and pendants." Feb. 16.
3857.—ROWELL, J. & R. H., "Petrol air-gas generators." Feb. 16.
3861.—LEES, M., "Gas-governors." Feb. 16.
3900.—STEVENSON, A. H., "Boxes for mantles." Feb. 17.
4010.—MUIR, T., "Bunsen burners." Feb. 18.
4040.—WILSON, J., "Gas-turbine." Feb. 18.
4090.—LAKE, W. E., "Gas-turbines." A communication from E. F. Bour. Feb. 18.
4124-5-6.—HALL-BROWN, E., "Gas-producers." Feb. 19.
4169.—BALE, E. A., "Gas-pipes." Feb. 19.
4202.—HANWELL, H. W., "Gas-pendants." Feb. 19.
4205.—HARRIS, H. E., "Atmospheric burners." Feb. 19.

The Norfolk County Council intend to tar nearly 70 miles of roads this summer in different parts of the county, at an estimated cost of £3500, with the view of abating the dust nuisance.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Gas Companies as Suppliers of Electrical Energy.

SIR,—In the last number of the "JOURNAL" I notice a letter from the Sales Manager for the Borough of Marylebone electricity supply; and I think you occupied much more space than was necessary as an answer thereto. I have had a fair experience of the cost of both gas and electrical energy as lighting agents, and I know, and have proved again and again, that, light for light, electricity costs more than double what gas costs—not in the laboratory, but in every-day ordinary use, and with prices as generally charged to-day. Nevertheless there are many people who are willing to pay this extra price; and the demand for electricity is a growing one.

My reason for writing this letter is to call attention to the fact that gas authorities in many of our smaller towns and villages are letting slip opportunities that shortly may be beyond them. We gas suppliers claim that we have cheap power to sell; yet we generate very little electrical energy for public supply. In fact, I believe that in one or two cases gas suppliers themselves are using suction plants or steam for the purpose of generating a supply of electricity for public use. In my opinion, the time is coming when most small towns will possess an electricity supply station; and I am certain also that such stations can only become really successful, for both consumers and suppliers, if and when installed at the gas-works.

I am fortunate in having charge of one such station supplying a small village; and I can tell anyone interested that it is possible for a station of this kind to pay its way, letting both departments stand on their own footing. I believe that to-day our electricity undertaking is one of the most successful in England; and we also admit that it is about the smallest giving a public supply. We attribute the success of our station to the following: (1) Using our own power gas; (2) not having cutting competition; and (3) having a single staff for both concerns.

H. MARSDEN, Manager,
Gas and Electricity Works, Honley, Huddersfield.

Feb. 25, 1910.

The Largest Gas-Supply District.

SIR,—I notice in the report of the proceedings at the half-yearly meeting of shareholders of the Croydon Gas Company that Mr. J. W. Helps considers his statutory area of supply the largest in the country. I am afraid I must lay claim at any rate to a larger—if not the largest—area; our gas districts covering over 128 square miles in 28 parishes, astride two counties—Surrey and Hants. Our electrical and water areas are not quite identical, or so large as the gas area.

R. W. EDWARDS.

Aldershot, Feb. 24, 1910.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

In accordance with the Standing Orders, the Chairman of Committees of the House of Lords (Lord Onslow) and the Speaker's Counsel (Mr. Ernest Moon, K.C.) had a conference to determine in which House the respective Private Bills should be first considered; and they decided that the following should originate in the Upper House:—

Abertillery and District Water Board Bill, Ammanford Gas Bill, Bishop's Stortford, Harlow and Epping Gas and Electricity Bill, Cambridge Water Bill, Farnham Gas and Electricity Bill, Garnant Gas Bill, Gas Companies Standard Burner (No. 1) Bill, Gas Companies Standard Burner (No. 2) Bill, Gas Companies Standard Burner (No. 3) Bill, Gowerton Gas Bill, Great Grimsby Gas Bill, Havant Gas Bill, Maltby and Tickbill Water Bill, Maltby Gas Bill, Matlock Bath and Scarthin Nick Urban District Council Bill, South Lincolnshire Water Bill, Southend Water Bill, Thorne and District Water Bill, Wicklow Gas Bill.

Petitions have been presented against the following Bills:—

Abertillery and District Water Board Bill, by the Blaenavon Company, Limited, the Monmouthshire County Council, the Abergavenny Corporation, and the Usk Conservators.

Bishop's Stortford, Harlow and Epping Gas and Electricity Bill, by the Essex and Hertfordshire County Councils and the Bishop's Stortford and Sawbridgeworth Urban District Councils.

Cambridge Water Bill, by Corpus Christi and Trinity Colleges, Cambridge, the Cambridge County Council, and the Cambridge Corporation.

Farnham Gas and Electricity Bill, by Conservators of the River Thames and the Farnham Urban District Council.

Gas Companies Standard Burner (No. 1) Bill, by the London County Council; the Wandsworth Borough Council; the Bootle, Hastings, Liverpool, Maidenhead, Scarborough, Swansea, and Torquay Corporations; the Allerton, Chiswick, Great Crosby, Heston and Isleworth, Ilford, Letherland, Twickenham, and Waterloo-with-Seaforth Urban District Councils; and the Mersey Docks and Harbour Board.

Gas Companies Standard Burner (No. 2) Bill, by the Bournemouth, Cambridge, Faversham, Hemel Hempsted, Newport (Mon.), Poole, Reading, Shrewsbury, Tunbridge Wells, and Wolverhampton Corporations; and the Cheshunt, Harrow, Herne Bay, Radcliffe, Romford, Wealdstone, and Wembley Urban District Councils.

Gas Companies Standard Burner (No. 3) Bill, by the Bath, Exeter, Godalming, Guildford, Ipswich, Plymouth, and Southampton Corporations; and the East Stonehouse, Teddington, and Walton-upon-Thames Urban District Councils.

Gowerton Gas Bill, by the Gorseinon Electric Light Company and the Swansea Rural District Council.

Maltby and Tickhill Water Bill, by the Rotherham and Sheffield Corporations, the Tickhill Urban District Council, and the Rotherham Rural District Council.

Maltby Gas Bill, by the Dinnington and District Gas Company, the Rotherham Corporation, and the Rotherham Rural District Council.

Matlock Bath and Scarthin Nick Urban District Council Bill, by the Matlock Urban District Council.

South Lincolnshire Water Bill, by the Bourne Urban District Council and the Bourne Water Company.

Southend Water Bill, by the Leigh-on-Sea Urban District Council.

Thorne and District Water Bill, by the Crowle Urban District Council.

Wicklow Gas Bill, by the Rathdrum Urban District Council.

HOUSE OF COMMONS.

The following progress has been made with Bills:—

Bills presented, read the first time, and referred to the Examiners: Brighton and Hove Gas Bill, Bristol Gas Bill, East Grinstead Gas and Water Bill, Exmouth Gas Bill, Mallow Gas Bill, Pontypridd Water Bill, Shirebrook and District Gas Bill, Slough Water Bill, South Hants Water Bill, Staffordshire Potteries Water Bill, Tipperary Gas Bill.

Bills presented, read the first time, and ordered for second reading: Bradford Corporation Bill, Egremont Urban District Council (Gas) Bill, Exmouth Urban District Water Bill, Gas Companies Standard Burner (No. 1) Bill, Kingswood Water Bill, Little Hulton Urban District Council Bill, Mallow Urban District Gas Bill, Middlesbrough Corporation Bill, Middleton Corporation Bill, Mountain Ash Water Bill, Pontypridd and Rhondda Joint Water Board Bill, Rhondda Urban District Council Bill, Warrington Corporation Bill, Worksop Urban District Council Bill.

LEGAL INTELLIGENCE.

WATER SUPPLY FOR RAILWAY STATIONS.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Thursday, Feb. 24.

(*Before Justices* PHILLIMORE *and* BUCKNILL.)

Metropolitan Water Board v. London, Brighton, and South Coast Railway Company.

This was an appeal by the plaintiffs from the decision of His Honour Judge Woodfall, at the Westminster County Court; and it raised the question whether water supplied to railway stations for the purpose of being used in water-closets and urinals was a "domestic" use within the meaning of the Act.

Mr. DANCKWERTS, K.C., and Mr. A. B. SHAW appeared for the appellants; Mr. YOUNGER, K.C., and Mr. CLODE represented the respondents.

Mr. DANCKWERTS said the decisions went to show that, in determining the purpose for which water was supplied, one had not to consider the use of the premises, but the purpose for which it was supplied; and Mr. Justice Neville had lately held, in the South Suburban Gas Company's case, that water supplied to gas-works for sanitary purposes was a "domestic" use of it.* In the present case, the water was supplied to the West Norwood Station, and was used, among other purposes, for flushing urinals. The question turned on the proper construction to be put upon the Metropolitan Water Board (Charges) Act, 1907. Section 3 incorporated the Water-Works Clauses Act, 1847, except section 35, which obliged the undertakers to keep their mains supplied with sufficient water for domestic use. Section 8 provided that the Board should, at the request of an owner of any tenement, supply a sufficient quantity of water for domestic purposes at a certain rate per cent. This was qualified by section 9, under which, if premises were used for trade purposes, the occupier obtained a rebate. Section 16 related to a supply by meter for other than domestic purposes; and section 25 enacted that, for the purposes of the Act, the expression "domestic purpose" included water-closets, and also baths capable of containing not more than 80 gallons, but not water for steam, gas, or other engines, &c.

Justice PHILLIMORE asked whether plaintiffs contended they were entitled to 5 per cent. on the rateable value of the whole station.

Mr. DANCKWERTS believed not, but said the amount was not in question in the Court below. His contention was that water supplied to closets was a "domestic" purpose within the meaning of the Act, and had been so held by Mr. Justice Neville in the case cited.

Mr. YOUNGER argued that the decision referred to had no application to the present case. *Primâ facie* a supply of water to urinals on the platform of a railway station could not, by any stretch of language, be treated as a supply for "domestic" purposes. The Court had to consider the elements of domesticity; and unless it found domesticity in the *locus in quo*, it had never been held to be a "domestic" purpose. Here the rateable value of the station was £240, and the Water Board, finding that water was being used for cleaning and flushing urinals, claimed £12; whereas the respondents contended they ought only to pay £8 9s. 3d.—the rate for a supply by meter, which sum had been

* See "JOURNAL," Vol. CVIII., p. 191.

paid into Court. There never yet had been a decision that water used in urinals at railway stations was a "domestic" purpose within the meaning of the Act. He submitted that, under section 16 of the Act of 1907, the supply of water to urinals and closets was one for "railway" purposes. The contention on the other side really amounted to this—that the words "domestic purpose" meant "for the use of man;" but he could not find any authority to justify such a proposition.

Their Lordships reserved judgment.

Ticehurst and District Water and Gas Company.

Last Tuesday the action of *Locke v. Ticehurst and District Water and Gas Company* was heard as a short cause before Mr. Justice Eve in the Chancery Division of the High Court of Justice, on a motion by the plaintiff, for whom Mr. Hurrell appeared, for judgment to be entered in accordance with agreed minutes. Mr. Hurrell said the action was really for the appointment of a receiver; and it was a consent order that was asked for. Mr. Martin, who represented the Company, explained that it was a statutory one incorporated by Act of Parliament. There was a serious question arising as to whether certain of the debentures had been validly issued; and though the Company admitted that those held by the plaintiff were in order, they did not wish to make any admission in regard to others. A receiver had been appointed; but the order was not in proper form, having regard to the fact that the Company was a statutory one. He asked that the order should be discharged and another made, appointing a receiver in the proper form to receive the net earnings arising from the undertaking. After some discussion as to the form of the order, his Lordship entered judgment for plaintiff, and made the order as desired.

Winding-Up of the Kitson Empire Lighting Company.

In the Chancery Division of the High Court of Justice last Friday, Mr. Justice Warrington had before him the case of *Higgs v. Kitson Empire Lighting Company*. It was a motion by Mr. Hunt, on behalf of the plaintiff, suing for himself and the other debenture holders of the Company, for the appointment of a receiver and manager. He said the Company had issued debentures to the amount of £10,000, of which plaintiff held £1000; and the application was based on the ground of jeopardy. The debentures were due in September, 1918; but there was a provision in the trust deed under which they became immediately due if the Company were carrying on business at a loss. He had evidence to show that the concern was hopelessly insolvent, and that it had been working at a heavy loss since it started in July, 1908. A petition had been presented, and resolutions had been passed for voluntary winding-up. The report of the Auditors showed that the undertaking was in a critical condition, and that there was no possibility of obtaining further capital. Mr. Holmes, for the Company, said he could not oppose the application, though he was not in a position to consent to an immediate judgment, as there was a possibility of a scheme of arrangement being carried out. Mr. Hunt said the Company carried on business at Stamford; and as Mr. Grey, a wholesale ironmonger, had been appointed Receiver at the instance of the debenture holders, he asked that this gentleman should be appointed Receiver and Manager. His Lordship complied with the request, but directed that Mr. Grey should not continue to act beyond the last Friday in Easter sittings without a further order.

The Ownership of Money in Gas-Meters.

The question as to the legal title to money put into a penny-in-the-slot gas-meter cropped up again last Wednesday before Mr. Biron, at the Old Street Police Court. A woman named Louisa Wylie, married, and living in Hulley Place, Hoxton, was charged on remand with having stolen, between the 11th and 18th of January, various sums, amounting to 14s. 10d., the property of the Gaslight and Coke Company. The only evidence given was that of Archibald Hughes, a collector for the Company, and the constable who took the prisoner into custody, and to whom she admitted having had the money. The evidence of the collector showed that according to the meter index the amount named in the charge should have been in the cash-box, but was not. The meter was rented in the name of the prisoner's husband, as the tenant of the house; but it served the needs of two supplies. The prisoner said the money was put in by her or her husband, and when she took it—on two or three occasions—she was "hard up." Mr. Biron raised the question as to whom the money belonged to. Possession had not passed to the Gas Company by its being dropped into the meter; and this construction was borne out by the Act of Parliament, which made the tenant liable for the gas consumed. Mr. Humphreys, solicitor, reminded his Worship that the renting of penny-in-the-slot meters was the subject of special contracts with the tenants, which made them liable. Mr. Biron said they were, civilly—that was to say, only by County Court process; while under the Gas Act the Company could go to the Police Court and get summary judgment. He added that the husband of the woman was liable. Mr. Humphreys said the Company hoped to recover the amount. Mr. Biron intimated that he did not feel called upon to decide that the prisoner had stolen the money of the Gas Company, though she had been given into custody for it by their representative. He proposed to deal with her in another way, in the interests of her home and her husband. He ordered her to be put under probation for twelve months, one of the conditions being that she abstained from drink for this time. If she broke the order, she would be brought to the Court and sent to prison.

Extension of Incandescent Gas Lighting in Battersea.—The Highways Committee of the Battersea Borough Council have accepted an offer from the Gaslight and Coke Company to convert 62 gas-burners in the several depôts from flat-flame to incandescent lighting free of charge, and to maintain the burners for 2s. per year each. The Health Committee have accepted a similar offer from the Company with regard to 16 gas-burners in the chalets by Chelsea Bridge.

MISCELLANEOUS NEWS.

ILLUMINATING POWER AND TESTING AT SHEFFIELD.

Gas Company's Application for a Provisional Order.

An inquiry with regard to the application of the Sheffield United Gaslight Company for a Provisional Order to enable them, among other things, to reduce the candle power of the gas supplied by them and to adopt for testing the "Metropolitan" No. 2 burner, was held by the Hon. T. H. W. PELHAM at the offices of the Board of Trade last Tuesday.

Mr. G. M. FREEMAN, K.C., appeared for the Company; the Corporation being represented by Mr. COURTHOPE-MUNROE.

Mr. FREEMAN stated that the Gas Company asked for power to carry out two or three minor improvements. Their first object was to bring the illuminating power of their gas and the testing up to modern lines—in other words, to be able to supply 14-candle instead of 16½-candle gas, according to their present requirements, and to use the modern burner which was prescribed almost everywhere now. The Company also desired to be able to offer their debentures by tender, as well as by auction, to which they were now limited; and to hold their meetings annually, instead of half yearly. Explaining that a certain number of people did not care to attend sales by auction, though they would be perfectly prepared to tender, he said the Company found when they last offered their stock that they did not get as high a price as they should have obtained, nor sell all that was offered. Seeing that the concern was paying the maximum dividend, this alteration would be absolutely to the benefit of the public. The only part of the application to which there was any opposition was the proposed reduction of the candle power and the alteration of the test. He could not quite understand the reason for the objection of the Sheffield Corporation. During the last few years, the question of the reduction of the illuminating power of gas supplied had been before the Board of Trade time after time. The whole matter was fought out by the South Metropolitan Company under the management of the late Sir George Livesey; and he thought if there was one proposition which was established, it was that 14-candle power gas, with the incandescent burners now used, effected an absolute saving, and that anything beyond this quality was waste, which made the gas more expensive without any corresponding benefit to the consumer. In no modern case in which application for 14-candle power was made had the Board refused it; and there were between fifty and sixty such instances. As regarded the testing alteration, he did not think the Corporation could seriously dispute that improvement. The Company proposed to adopt the No. 2 "Metropolitan" argand; and this change would prove very beneficial to the consumer.

Mr. *Hanbury Thomas*, now a Director of the Company, before that General Manager for 25 years, was the first witness in support of the application. The Company had, he stated, 95,000 customers; and they supplied 3,500,000,000 cubic feet of gas annually. They furnished the Corporation with the public lighting of the city, with the exception of a few electric lamps in one or two of the principal streets. The Corporation, who were the owners of the electricity undertaking, provided their own lighting in these instances. The Company also supplied customers largely for power, and for cooking and heating. To the general consumer, the price was 1s. 4d. per 1000 cubic feet; but larger consumers obtained a reduction after they had used 500,000 cubic feet (about £33 worth per annum); and larger consumers still, requiring over 6,000,000 cubic feet, obtained their gas at 1s. per 1000 feet. The public lamps of Sheffield were all supplied at the latter rate. The average price of the gas sold by the Company was slightly under 1s. 3d. per 1000 feet.

Mr. FREEMAN: I think your price compares very favourably with that of your neighbours?

Witness: It does.

Why do you wish to be allowed to reduce your standard from 16½ to 14 candle power?—One reason is that we believe an enriched gas is not so useful to the general body of consumers.

In other words, the consumers would get better value for their money?—I may say we do not propose to go down to 14 candles all at once. All we propose to do is to leave off enrichment; and this will probably make 1-candle power difference. I cannot say for certain, because we have not yet supplied unenriched gas; but we use a very good class of coal, and have no reason to anticipate a reduction of more than a candle power to begin with. But as time goes on, and improvements in gas making come forward, we want to be in a position to take advantage of them; and we think that if lower quality gas is sufficiently good for a number of other places in the kingdom, it is good enough for Sheffield.

You are aware of the enormous difference made by the incandescent burner?—Yes; an enormous difference.

You know that, for a great number of places, 14-candle power has been given by the Board of Trade?—It is the standard generally given nowadays—in fact, in every case; and we desire to fall into line.

As you are paying your maximum dividend, every benefit arising from the reduction of the candle power of the gas will go to the consumer, not to the Company?—Not a penny will go to the shareholder. The whole of it will go to the consumer.

So that this Provisional Order really is applied for, not for financial advantage for yourselves, but out of public spirit?—Yes.

Witness, in reply to the Hon. T. H. W. PELHAM, said the maximum dividend of the Company was 10 per cent.; and they had been paying this for years. At the same time, at every opportunity they had reduced the price of gas to the consumers.

Mr. FREEMAN: We may take it that it is an exceptionally low price?

Witness: Yes; very exceptionally low.

You know of cases of your neighbours who have reduced their gas to 14 candles, and it has proved very beneficial?—Decidedly. It is a far more useful gas now than 16½-candle gas for every purpose—not only for incandescent lighting, but for engines, fires, and manufacturing purposes.

The No. 2 "Metropolitan" argand burner is the same that has been adopted in all recent cases?—Yes.

Mr. FREEMAN: You think it would be to the advantage of all concerned that you should be able to offer your stock by tender?—Decidedly. It is what is done in every other case. It is to the advantage of the consumers that we should obtain as big a premium as possible, because the premium bears no dividend.

Mr. COURTHOPE-MUNROE (in cross-examination): You know that the Corporation are not acting toward you in any sense in a hostile way in regard to this inquiry; but they want to see exactly how matters "pan out" under the Company's proposals.

Witness: I have tried already to explain that, and although it may not be hostility, it is putting us to very considerable expense.

Do you suggest that the Company's sole reason in asking for this Order is to put it in the way you did—that as it is good enough for other places to have the "Metropolitan" burner and 14-candle power gas, you ought to have it too?—Decidedly. I go further and say it ought to be so over the whole kingdom.

It is not because you really want it?—Yes, because we want to be progressive. We have always been; and we want to continue to be.

You do not hope to get any personal benefit for the Company. It is simply to come into line?—Can you show me any benefit for the Company?

It is really simply a desire to come into line?—And to progress.

You know, do you not, that there are three Bills in Parliament this session which affect something like 47 companies scattered throughout the country; and all these are simply asking Parliament to give them the improved burner. They are saying: "We are content to leave our candle power as it is (in some cases higher than yours, in some cases lower). All we ask is for the 'Metropolitan' burner, which gives a more true test."—That is so; but if these companies were coming separately, they would ask for the 14-candle power. I know people connected with most of these companies.

Why should the Sheffield Company not fall into line with these 47 companies? You agree that all these are content with their present candle power, provided they obtain the improved test?—I do not agree that they are content; but they do not all want to come to Parliament separately at once. It is a very costly thing.

Do you agree that the effect of substituting the "Metropolitan" burner for the old No. 1 argand makes a difference of about 2½-candle power?—No; about 2-candle power.

So that, by the adoption of the burner alone, you would be able to bring your gas down from 16½ to 14½ candles?—Yes.

Do you suggest that you can manufacture direct from coal 14-candle power gas?—We do not intend to try.

Supposing you were to manufacture gas from coal without any dilution, it would be more than 14-candle power?—A good deal.

Do you intend to produce diluted gas?—No; we do not.

Then why are you asking to cut down your candle power?—We want to fall into line with all the other companies who have obtained the reduction. We believe every company will get it in time. It is only a question of opportunity to make the application.

But you are cutting down the gas by your new burner from 16½ to 14½ candles, and you never intend to make diluted gas?—I do not say never. We wish to be in a position to take advantage of any improved methods of manufacture that we can. We may get more gas out of the coal in time.

Supposing you do make diluted gas, the person who uses it has, in order to get the same light and heat, to buy more gas?—No, we should not be so foolish as that. We have no monopoly in the supply of light, or heat, or power; and we are not going to be so foolish as to reduce the quality of the material we sell to such an extent that it would not be advantageous to our customers to use it. If we do, we shall lose our business.

That sounds very well. But supposing a person must have gas, having got it laid on, and it being the only thing he can work with, you are the only persons supplying it; and if you give a diluted gas which has not the same illuminating or calorific power, the only way he can make up the difference is by burning more?—But you are supposing a thing that I do not think can happen.

On this supposition, that would be the position?—If you suppose all sorts of things, all of the things might happen.

It is quite true that your Company is one of the most successful in the North of England, that your price is very low, and that you have paid the maximum dividend for many years. You are in the happy position of having an unappropriated profit which you carry forward—the 1908 figures were £81,000, almost another 10 per cent. reserve fund?—It is £75,000 now. For the last two years we have had to draw on the surplus profits, because we have not made our dividends. When we last reduced our price, we knew that we should have to draw upon our surplus profits. But for the surplus, we should have had to charge more for gas. The fact that the Company sell gas at such a low price, and that these profits have accumulated, shows that the Company has been well managed, and in the interests of the consumers.

You cannot point to any other company with anything like the same carry-forward?—I cannot point to any other company selling gas at this price.

I agree. You are abnormal in both cases. You say the gas under the new condition of things would be more useful to the consumer?—That I am sure of.

Do you suggest that as regards people who use flat-flame burners?—No; but there is no necessity to have flat-flame burners nowadays. Consumers save money by having incandescent ones. Comparatively very few indeed of the Company's 95,000 consumers use flat-flame burners; but I cannot give any figure.

Do you know the Corporation have 1462 flat-flame burners?—No. The sooner they change them into incandescent burners, the better it will be for them.

Mr. COURTHOPE-MUNROE: You cannot deny that it will be harmful to users of these flat-flame burners?—I do not think they will notice any difference.

Mr. COURTHOPE-MUNROE observed that the Company's Order did not contain any provision similar to that which was included by the Gaslight and Coke Company—that if the powers asked for were obtained, the promoters would provide new burners free of cost.

Witness replied that this was not a large matter. It might apply if they were going to cut down the quality of the gas to 14 candles; but they were only stopping enrichment—representing a difference of about 1-candle power.

Mr. COURTHOPE-MUNROE: You are asking to be put in the same position as the Gaslight and Company. Can you defend that provision not being in?—If it were a question whether we should have the powers or not, we should be willing to supply the burners. But I am told by several companies that they have laid in a stock of burners, and they have never been applied for—not being found necessary.

In the Gaslight and Coke Company's Act there was also a calorific standard. You do not include that?—It was put in experimentally there.

There are a great many people in Sheffield who burn gas to heat their tools?—A great many. That is one of our objects in wishing to reduce the candle power—that we can save them very considerable cost.

Mr. COURTHOPE-MUNROE said he was told by experts that to cut down the Company's gas to 14-candle power would mean a loss of 12 per cent. in heat.

Witness replied that he could not say if this figure was correct, as the Sheffield Company had never tried. The result of obtaining this power would, however, be the same in their case as with other companies.

Mr. COURTHOPE-MUNROE: Is it not very desirable that in Sheffield the gas should have a high calorific value?

Witness: It is desirable that it should have a good calorific value.

The only way the operative could get extra heat for his tool, supposing your gas is deficient, is to use additional gas?—No; I should think he would go to another fuel.

At Liverpool the present candle power is 20·40, at Scarborough 16·20, at Ormskirk 16·50, and at Shrewsbury 16 48. If these Companies are content to stick to their candle power in the Bills now before Parliament, why should Sheffield want their candle power reduced?—I should prefer to give you cases like Leeds and Manchester. Those mentioned are all small and not trading places, except Liverpool.

But Liverpool is; and they are content for their candle power to remain as it is?—No; they are not. I know Liverpool; and they will be coming for a reduction some time.

Re-examined by Mr. FREEMAN, witness said that a great number of places that had reduced their candle power were comparable with Sheffield. The result of reducing the candle power had worked beneficially in these places. He read the following letter he had received from the Rotherham Gas Committee: "Since we obtained authority in 1902 for a reduction from 16 to 14 candles, we have not experienced any difficulty whatever with our customers. We commenced by gradually reducing it from 16½ to 15½ candles; and this standard we maintain." There was the same experience, witness added, at Leeds. In 1905, they supplied gas of 18·40 candle power; in 1906, 18·20 candles; and in 1909, 15·49 candles.

Mr. *Charles Carpenter* was called and said that the Bill presented by the Gaslight and Coke Company was strongly contested by the London County Council and others before the Parliamentary Committee; but the result was that the reduction in candle power was granted. It was prophesied by the experts for the London County Council and other opposing bodies that the consumption of gas would increase very considerably—16 per cent. was mentioned. Their actual experience, however, was that the increase was not above the normal—1 to 1½ per cent.—although they reduced the quality first to 15 and then to 14 candles. They did not get the increased consumption which theoretically should have come about in proportion of 16 to 14.

Mr. FREEMAN: Is the sole result of the reduction, in your experience, an economical treatment instead of a wasting treatment?

Witness: Yes; every penny of saving would go to the consumers The only advantage to the Company would be that the powers would consolidate it and make its footing more secure than now—if that were possible.

From experience of the South Metropolitan Company, do you say it would be to the public advantage?—There is no doubt about it whatever. That was threshed out most completely when we set the example which has been followed by many other companies.

It has been suggested, on behalf of the Corporation, that there would be a loss of calorific value?—There is a slight loss of calorific value, about 2 per cent. The proportion is 147 or 148 to 150 or 151.

Replying to further questions by Counsel for the Corporation, witness disagreed with the opinion expressed that there would be a loss of 12 per cent. with the new burner. He might go up to 4 per cent., but not more.

Mr. *H. E. Jones* said he regarded the proposals of the Gas Company as distinctly to the advantage of Sheffield. Fourteen candles was about the illuminating power which predominated in the kingdom; and generally manufacturers had adapted their appliances to it. There was not a proportionate extra heating power in the higher quality gas; and unless they had special fittings, part of the power was wasted.

Mr. FREEMAN: Then you do not agree that men who want to heat their tools would find much difference?

Witness: No, because with 16-candle power gas they would probably find that there was a waste in carbon. The loss of calorific power would be about 4 or 5 per cent. at the outside.

Mr. *J. F. Bell*, the Engineer and Manager of the Derby Gas Company, said their experience of 14-candle power gas in a place similar to Sheffield was a large increase in consumers and no complaints.

In reply to Mr. COURTHOPE-MUNROE, witness said 14⅜ candles was the lowest they had got to. They had been doing 15 candles, and their average was about 16 candles.

Mr. COURTHOPE-MUNROE said the Corporation considered the Company were asking too much when so many other companies were at present merely applying to Parliament for power to use the new burner. The Company were really only asking for the power to reduce the quality of their gas because they seemed to have got it into their heads that they were under some moral obligation to fall into line with other concerns. The Corporation had a real fear that if the Company were given the powers asked for, it would really mean a drop of 5 or 6 candles,

and this would be bad for Sheffield, which stood in rather a peculiar position as regarded wanting gas of a certain calorific value. If both points for which the Company asked were conceded, they contended that the gas would be deprived of so much of its heating power that the operatives would not be able to heat their tools as they had been accustomed to, without being compelled to use a larger amount of gas than at present. The people of Sheffield said—no doubt, because the price of gas was abnormally low—they preferred to retain the calorific value of their gas rather than obtain any possible financial benefit. Pointing out that if the Bills before Parliament, by which 47 companies were seeking power only for the new test burner, became law the Board of Trade would have two sets of precedents, and it would be a question as to which they would in future act on, Counsel contended that this was an inopportune moment to give the Sheffield Gas Company both the things desired as against these other 47 companies. The Company's consumers had a strong objection to the proposed reduction. He commented on the fact that the proposed Order left out the three points in the Gaslight and Coke Company's Act—viz., free burners, a calorific test, and price; the latter, of course, not applying in this instance. The sole reason apparently for the Company's double-barrelled request was to "come into line;" and if the Board of Trade considered those whom the Corporation represented had fair ground for believing they would be harmed in the way indicated, he asked that the Provisional Order should be allowed to go forward simply providing for the alteration of the burner.

Mr. *William Newbigging* stated that the two things asked for would affect the consumer adversely. The present prescribed illuminating power was 16½ candles. Under the Order, it was proposed to cut it down to 14 candles. Thus, so far as illuminating power was concerned, it was obvious that there was a reduction of 2½ candles. But over and above this, if they adopted the "Metropolitan" argand No. 2 burner in place of the "London" argand No. 1, there would be a further reduction equal to from 3 to 3½ candles.

Mr. COURTHOPE-MUNROE: Then there will be a total reduction, in your view, of 6 candles?

Witness: Yes.

Have you formed any opinion as to what this means in loss of calorific value?—From a great many experiments we have made in the North of England, we find that the average reduction of heat value is from 2 to 5 per cent. per candle. In the case of Sheffield, where they only supply what I call a straight coal gas, I would put the reduction at 2 per cent. per candle; so that, on 6 candles, there would be a reduction of 12 per cent.

Do you think there is practical importance in trying to retain this calorific value?—I do. The Company themselves state in their answer to the objection of the Corporation that they are trying to develop the use of gas for the heating of furnaces. For this purpose, the heat or calorific value of gas is all important. In a good many processes for which gas is used, the actual price is a minor matter compared with its heating value. The Company could not give a reduction in price equivalent to the loss the consumer would suffer by the drop of heating power—in the time of the men employed, &c. The consumer would have to suffer the injustice of being deprived of the present heat value. It was easy to say he must turn to some other fuel; but he could not—he was confined to the supply of gas from the Company.

To get the same heat, he would have to burn more gas. Of the 58 companies who had obtained both these powers, there were not more than two or three who had availed themselves of the power to come down to 14 candles; so, as far as practical experience went, there was nothing to judge from.

In cross-examination, witness said that the reduction from 16 to 14 candles was not only not in the interests of the consumer, but he would go further and say it was not in the interests of the Company.

Mr. FREEMAN: Can you conceive any reason why the Company should introduce any alteration which would reduce their earning capacity?

Witness: I do not think they will do that. I do not think they will act on the powers if they are granted to them.

In that case, how will those for whom you appear be hurt?—We shall not be. If the Company will give an undertaking that they will not act on the powers granted, we shall be perfectly satisfied.

Don't you know the position? We have no intention of immediately doing so; but we desire to take advantage of the developments of science as they arise?—In that case, I think you are getting ahead of science. Why not wait until this discovery has been made, and then come to Parliament?

This concluded the evidence. The decision of the Board of Trade will be announced later.

Suicides by Gas at Bradford.—Walter Hebb, a prominent swimming official at Bradford, committed suicide last week at his workshop, by inhaling gas from an india-rubber tube attached to the gas-bracket. It was stated that he had lately been drinking heavily, and had got into financial difficulties. On Wednesday, Harry Youman was found in his house at Manningham dead, with one end of a rubber pipe in his mouth, and the other end attached to a gas-bracket.

Fall in Auer Gas-Light Shares.—According to a special communication to the "Financial News," sent from Berlin last Thursday, the shares of the Auer Incandescent Gas-Light Company have of late sharply declined. Our contemporary's correspondent said: "The depression was provoked by the news of the proposed increase of the Company's capital, which the Directors proposed to double. These proposals not having, however, met with approval of the public, the Directors withdrew them, and thus provoked another important fall of the prices of the shares. After these events the market became steady; but suddenly the shares were again readily offered all round. The reason is reported to be as follows: The Auer Company are manufacturing, as a speciality, the Osram glow lamp. The competition which exists in the German light industry has given rise to a reduction of prices of glow lamps from 3 to 2 marks; and shareholders in the Auer Company were afraid the Company would be obliged to reduce their prices for Osram lamps. It appears that it is just this branch of their industry from which the Company earn good profits."

COMMERCIAL GAS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW in the chair.

The Secretary (Mr. H. D. Ellis) read the notice calling the meeting; and the Directors' report and the accounts were taken as read.

COAL MINES (EIGHT HOURS) BILL—PORT OF LONDON CHARGES.

The CHAIRMAN, in moving their adoption, said: The half year with which the report and accounts deal, has been a very satisfactory one, so far as the inner working of the Company is concerned; but it is not quite so satisfactory as regards outside circumstances which affect our business. I do not think we have ever had more favourable accounts to present to you at any time since I have known the Company; for almost every item in the accounts speaks of progress, prosperity, economy effected, and improvements in manufacture achieved. The outside circumstances to which I refer are two. First, the Mines Regulation (Eight Hours) Act, which came into force in the North on Jan. 1 last, and which has resulted in a good deal of disturbance and dissatisfaction among the colliers. They find that the restriction of their hours of labour will in all probability lead to diminished earnings, and in some cases to the loss of their Saturday half-holiday; and, not unnaturally, they object strongly to both. The colliery proprietors also find that the output from their mines is in danger of being diminished; and their efforts to make up this loss, as you know, almost ended in a strike. The result to us has been an interruption of the supplies of coal, which has caused us considerable anxiety and some loss. We are not out of our difficulties even now. At any rate, the effect of the Act seems to be that the men will lose in their wages, the owners in diminished output and increased cost of getting coal, and the country at large will have a tax imposed upon it in a permanent increase in the price of coal. These were exactly the results that were pointed out to the Home Secretary when we attended before him in deputation to protest against the Bill at the beginning of last year; and it did not require any amount of abnormal wisdom to make such a prophecy. The other rather disquieting circumstance is the Port of London Authority's proposal to impose heavier dues on goods coming into and through the Port of London. It was contemplated, when the Authority was constituted, that a rate of ½d. per ton of coal would be amply sufficient. Now they have issued a schedule of charges with a maximum rate of 3d. per ton on coal. To our Company ½d. per ton would have meant about £420 a year; 3d. per ton would mean £2500. And I should like to point out to you that we, as a Company, will not derive any benefit whatever from anything the Port of London Authority are likely to do; and therefore this extra charge on the profits would bring us no return in any shape. We are taking steps to oppose the schedule of rates so far as it affects us, at the inquiry which is being held (I think it begins to-day) before Lord St. Aldwyn. Apart from these two special circumstances, the general outlook in our district is a favourable one. Trade is surely, if slowly, reviving. Our bad debts, which are a certain sign of the state of business in our district, are smaller than they were last year, and less than usual. I think, too, that the contract for building a *Dreadnought* in our neighbourhood ought to add to the general prosperity.

RECORDS IN THE ACCOUNT.

Turning to the accounts, I think you will agree with me that the story we have to tell you is altogether a pleasant one. The proceeds of the sale of gas for the first time in the history of the Company exceed £200,000 in the half year; and the gross profit, also for the first time in the history of the Company, exceeds £70,000. I trust that both of these records are but stepping-stones to increased prosperity, and harbingers of greater success.

ISSUE OF NEW STOCK.

During the half year, it will be noticed, we issued £20,000 of 4 per cent. capital stock to our employees and consumers. This we were enabled to do under the terms of our Act, which does not allow us to give any preference to the proprietors in the issuing of new capital, as we formerly had power to do. But the Act does allow us to give a small preference to consumers and employees. Most of this stock was taken for the purpose of the profit-sharing scheme; and so it will be held in future by the employees of the Company. You will notice that we received premiums amounting to £1400 in respect of the issue.

THE CAPITAL ACCOUNT.

Our expenditure on capital account amounted to £9691, all of which went for additional distributing plant. We added to our connections 2585 new stoves, 241 ordinary meters, and 3232 prepayment meters. Our consumers, you will see from the accounts, now number 98,485; so that when we have the pleasure of meeting you next time the number ought to be more than 100,000. Of these 98,000 consumers, 24,000 are ordinary and 74,000 are coin-meter consumers. I am glad to be able to tell you the proportion of our capital expenditure to our sale of gas has again fallen. It is now only £449 per million cubic feet of gas sold; and if you deduct the cost of our ships, for the purpose of comparison with other companies, it is only £437 per million.

THE CAUSES OF GOOD RESULTS.

The good results of the half year are due to three causes. First of all, the saving in the cost of coal and oil; secondly, the improved methods of manufacture; and, thirdly, the larger receipts from the sale of gas. Our coal and oil cost less by £11,579; and our make of gas has risen to 11,582 cubic feet per ton, which is very satisfactory, and reflects the greatest credit on our Chief Engineer and the Engineers at our stations. Our carbonizing wages have fallen by £2726, which is 16½ per cent. of what they were in the corresponding half of last year. This does not necessarily mean that we are spending less money on wages, because the increase in the number of our outdoor employees more than makes up for it. But it does mean that there are fewer men engaged in the exhausting toil of the retort-house, and more finding profitable employment in other departments. We have sold during the half year 51 million cubic feet of gas more than in the corresponding half of

1908. This represents in money £5808, and is equivalent to 3¼ per cent. increase in the sale of gas. Most of it took place through the coin-meters; but one gratifying feature of the half year (and I am pleased to note it) was that we had an increase for the first time for many half years in the sale of gas through ordinary meters. For some years past our increase has been due to the number of coin meters we fix. You may be interested to know that the Gaslight and Coke Company had an increase of 4¾ per cent. on their gas sales; and the South Metropolitan Company, just over 4 per cent.

FINANCIAL SUMMING UP—A PROSPECTIVE REDUCTION IN PRICE.

To sum up briefly the financial results of the half year, the proceeds from the sale of gas and the rental of meters and stoves are more by £7471; and residuals, chiefly owing to the lower price for coke, brought us in £4822 less. Coal and oil have given us a saving of £11,579; and we spent more than last year on wear and tear. Altogether, the result is a profit of £70,598. This time last year, the profit was only £63,845—that is to say, we have an increased profit of £6753. Turning to the net revenue account, the interest on borrowed capital amounts to £8832. The dividends at the same rate as the preceding half year—the dividends at the full statutory rates—will absorb £53,085, or, together, £61,917. We shall then have a surplus profit for the half year of £8681. We brought forward from last half year £23,058. We add to this the surplus of £8681, and carry forward into the new half year £31,739. That is, you see, more than the equivalent of three months' dividend. The surplus profit amounts to 1¼d. on the price of gas; and I think I may prophesy that, if we make favourable coal contracts when we come to renew them shortly, we may hope to be able to announce a reduction in the price of gas, which means an increase in your authorized dividend, and in the bonus paid to employees.

THE INCREASED VALUE AND STABILITY OF GAS STOCKS.

It will be observed from the accounts that we have written-down the investments which represent our reserve fund and insurance fund to their market value on Dec. 31 last. This cost us £6897. In pursuance of our Acts, our insurance fund is wholly, and our reserve fund partly, invested in trustee securities. As you are doubtless aware, this class of security has depreciated ever since the South African War. I think perhaps there are three causes for the depreciation of trustee securities. First there was the large amount created to pay for the cost of the war and to finance the Irish Land Purchase Act of 1903. The second cause is the large increase in the standard of comfort and luxury all over the country, which made people dissatisfied with the small return yielded by this class of security. The third cause is that Colonial Government securities are now authorized investments for trustees. Banks and other institutions which are compelled to invest in these securities, and to hold large sums of them, have suffered a loss—I was going to say of hundreds of thousands of pounds, but I should be nearer the mark if I said millions of pounds. We have suffered to the extent of £6897. I cannot help reflecting, as I am dealing with this subject, upon the comparative steadiness of gas stocks for investment. As I was thinking over this matter the other night, my mind went back seventy years. I am a large holder, I am sorry to say only as trustee, of stock of this Company which was purchased about the year 1840 by my grandfather. As I look at that stock, I see there has been an enormous increase in its value. As trustee under my father's will, I am a holder of stock purchased between 1865 and 1875; and I find again there has been a large increase in value. The bulk of the stock I hold in my own right was bought about the year 1888; and, looking at that, I find it has more than maintained—it has even increased—its value. And all these years we have been receiving a steady 5 per cent. or thereabouts on our investment. I merely allude to this as an illustration to show what a good investment gas stocks have been; and the best of it is that at the present time the prospect is as good as, or even better than, it has been at any time since 1840.

CONGRATULATION.

In conclusion, let me congratulate the Engineer and those who work with and under him on the good results of their efforts. By modernizing our plant and improving our methods of manufacture, they have succeeded in cheapening the cost of production, and so added to the earning power of the Company. I hope our Engineer will shortly have the satisfaction—the greatest satisfaction a gas engineer can have—of recommending the Directors to make a reduction in the price of gas. We have made very satisfactory arrangements for purchasing our oil supply for next year; and if we can make equally satisfactory ones for the purchase of coals, I think we may look forward to a prosperous half year.

The DEPUTY-CHAIRMAN (Mr. Walter Hunter) seconded the motion. He would only add one remark to what the Chairman had said, and that was with regard to the Mines Regulation (Eight Hours) Act. He believed that, in addition to the discontent that had been caused by the working of the Act as stated by the Chairman, there was additional discontent in that the Act had disarranged all the domestic economy of every miners' home in regard to hours of meals and that sort of thing; and this had made the wives and mothers very discontented. This only showed him the absolute folly of attempting to regulate the labour market by Act of Parliament.

The motion was unanimously carried.

Proposed by the CHAIRMAN, and seconded by the DEPUTY-CHAIRMAN, dividends were declared at the rates per annum of £5 4s. per cent. on the 4 per cent. stock and of £5 per cent. on the 3¾ per cent. stock, both less income-tax.

Moved by the CHAIRMAN, and seconded by Mr. H. E. JONES, the retiring Directors (Messrs. H. W. Gell and J. G. Pilcher) were re-elected; and on the proposition of Mr. PEARCE, seconded by Mr. F. JONES, the retiring Auditor (Mr. S. W. Savage) was re-appointed.

Submitted by Mr. M'NAUGHT, and seconded by Mr. JOHNSON, a vote of thanks was passed to the Chairman and Directors.

The CHAIRMAN acknowledged the compliment; and then, in eulogistic terms, he proposed a vote of thanks to the chief officers and employees, to one and all of whom, he said, the proprietors owed a deep debt of gratitude for their successful work. The Directors had not only the hearty goodwill of their staff, but also their enthusiastic desire for the well-being of the Company. The work was done well and willingly. The accounts spoke more eloquently than he could do of how the work was done.

The DEPUTY-CHAIRMAN seconded the motion; and it was cordially agreed to.

Mr. ELLIS, in replying for himself and the clerical staff, made an interesting statement regarding one point to which the Chairman had referred—that was as to the acquisition of stock by the employees during the half year. He observed that recently the great Gaslight and Coke Company had adopted a profit-sharing scheme, as had also the Tottenham, the Croydon, and other Companies in the neighbourhood of London and elsewhere. This showed that the scheme of co-partnership (or profit-sharing, as they of the Commercial Company preferred to call it) was extending very rapidly. It was going forward by leaps and bounds. The new issue of stock to which the Chairman had referred was offered to the employees; and he had the gratification of telling the proprietors that no fewer than 534 allotments included 190 men who did not hold a pennyworth of stock before. The result was that a very large proportion of the proprietary were employees of the Company. There were upwards of 3200 stock accounts in the Company, and 27 per cent. of them were those of employees. This showed how very large an interest the men had in the business, and how their interests were wrapped up with those of the Company; also that they had an object in doing the best they could for the Company. It proved, if anything could, the absolute soundness and success of the profit-sharing scheme which the Company introduced nine years ago. With an increase in the proprietary by 258 in the half year, they were growing into a large Company indeed.

Mr. STANLEY H. JONES replied on behalf of himself, the engineering staff, and the workmen. In the course of his remarks, he said that in the past half year they had established records; and he thought he was not too sanguine in saying they would be exceeded in future.

READING GAS COMPANY.

The Annual General Meeting of this Company was held last Tuesday, at the Offices, Friar Street, Reading—Mr. H. B. BLANDY, J.P., the Deputy-Chairman, presiding, in the absence, through ill-health, of Mr. J. Okey Taylor, J.P., the Chairman.

The SECRETARY and ACCOUNTANT (Mr. A. Canning Williams) having read the notice convening the meeting, the report and accounts were presented. In the former, the Directors stated that the steady progress referred to in the last report had been maintained. The sale of gas had increased by 14,092,800 cubic feet; the number of consumers had risen by 822; and 1175 gas cookers and fires had been added to the number on hire. The accounts accompanying the report showed that the income for the year was £100,609, and the expenditure £84,444; leaving a balance of £16,165 to go to the profit and loss account. The sum available for distribution was £24,827; and the Directors recommended the payment of dividends for the past six months at the rate of 5 per cent. per annum on the preference shares and ordinary stock—interim dividends at this rate having been declared in September last for the first half of the year.

The DEPUTY-CHAIRMAN, when moving the adoption of the report, expressed regret at the absence of the Chairman. The report referred to the steady progress made in the Company's business during the past twelve months, though in some respects it had been an uneventful year. They were able to make a further reduction of 1d. per 1000 cubic feet in the price of gas at the end of the March quarter. It might strike some of them that this was a small concession to make; but when they took into account the quantity of gas the Company sold, they would see that 1d. per 1000 cubic feet reduction amounted to a big sum during the year. The price of gas in Reading was now only 2s. 6d. per 1000 cubic feet, while in the outlying districts it was a little more. This was only fair when it was remembered that they were a Reading Company; and this being so, they were bound to make a higher charge to consumers of gas outside the borough. When the borough was enlarged a few years ago—*i.e.*, in 1887—the Company were willing to grant the residents in the enlarged portions the same advantages in regard to the price of gas that were enjoyed by the residents in Reading; and if a further enlargement of the borough should take place, the Company had fully resolved to act upon this precedent. There had been an increase of 14 million cubic feet in the quantity of gas sold, and they had 822 new consumers as compared with last year. Notwithstanding the reduction in price, the revenue from the sale of gas had been greater. The maintenance charges were higher, due to the cost of the extending business, and the balance of profit was £1245 less than the previous year. But at the same time they were able to pay all they were allowed to pay in the way of dividend. He should like to refer to the great increase that had taken place in the number of their slot consumers during the past few years. About ten years ago the shareholders were continually asking why the Company did not adopt the slot system. They could not do so at the time, because they had not the money, and had nearly come to the end of their borrowing powers. But in 1902 their Act of Parliament empowered them to raise fresh capital; and with this they were able to institute the slot system. At the present time they had nearly 9000 penny-in-the-slot meters in use, and about 1700 shilling-in-the-slot meters; and they had fresh applications every day. In connection with this system, 73,000 visits were paid to houses by the Company's collectors during the past year, and £21,000 was collected in pennies. This was an example of how small coins became big amounts. The Directors were considering how best to increase the use of incandescent burners among their prepayment consumers, the majority of whom already had incandescent burners, one type of which—the inverted burner—had become very popular during the last few years. It gave a very much greater light with a smaller consumption of gas than was the case with the old flat-flame burner. Passing on to refer to the unsettled state of affairs in the coal industry, the Deputy-Chairman remarked that the Eight Hours Act was causing a good deal of trouble; and the probability was that it might increase the price of coal, and so affect them as a Gas Company. If this should be the case and the

price of coal increased, the shareholders might rely upon it that the Directors would do all in their power to keep the price of gas as low as possible. In conclusion, he must acknowledge how very much they were indebted to their staff for the way in which the work of the Company was being carried on. The Engineer (Mr. Douglas H. Helps) and Secretary had done excellent work; and the Company had also every reason to be satisfied with the work of the members of the staff under their guidance.

Mr. T. E. HEWETT, in seconding the motion, endorsed the remarks made by the Deputy-Chairman as to the efficiency of the staff. He said the Company were particularly fortunate in having such gentlemen as their Engineer and Secretary; and he believed they had the loyal support of all the employees of the Company. It was satisfactory to note that the earnings for the past year, including the interest on stocks, were sufficient to pay full dividends with a margin of £1468.

The motion was carried unanimously.

On the motion of Mr. DRYLAND HASLAM, seconded by Mr. R. WILDER, the best thanks of the proprietors were given to the Chairman and Directors, for their able services in the Company's interest; both mover and seconder expressing regret at the absence—a very rare occurrence—of the Chairman from the meeting.

A vote of thanks having been unanimously accorded to the officers and staff,

Mr. HELPS, in returning thanks, said both the staff and the men took great interest in their work, and were working loyally in the Company's interests. He might add that the plant was in excellent condition. One great thing which struck him in connection with the working of a gas company now was that whereas twenty years ago for every man engaged on the district there were about ten men employed on the works, to-day it was quite the reverse. This was an indication that the Company were looking after the consumers, as, indeed, they had to do in view of their competitors. He had had some 27 years' experience in gas-works, and when one remembered that the increase in the consumption of gas in the district of a single gas company last year was equal to the whole of the gas consumed in a place like Reading, he thought this was a pretty clear indication that the gas industry at the present time was certainly very much alive and prosperous.

The SECRETARY also replied, and assured the proprietors that all the members of the staff worked loyally and well, and did their very utmost in the interests of the Company.

The ordinary meeting closed with a vote of thanks to Mr. Blandy.

The Standard Burner Bill.

A Special Meeting was then held, when the approval of the proprietors was asked for the promotion of the Gas Companies (Standard Burner) Bill.

The DEPUTY-CHAIRMAN, in proposing the necessary resolution, again expressed regret at the absence of the Chairman, who, he said, would have been much better able than he was to explain the object for which the meeting was called. However, he (the speaker) would read some notes which the Chairman had made with reference to the matter, and would afterwards ask the Engineer to explain the position. He then read the following notes:

The restrictions imposed upon gas companies in former days are no longer justified, seeing that they do not now hold a monopoly to supply light, &c. Such restrictions are highly injurious to companies possessing a large number of consumers. These consumers demand a good gas at the lowest possible price; and it is to the Company's interest to supply a gas suited to the various purposes for which gas is now used.

For years past the Company have made special efforts to provide consumers with appliances of the best description, and consumers have been able to obtain a very high standard of illuminating power from the burners which have been supplied to them. The Company's policy has been to give every encouragement to improvements as they have been developed; and this policy has brought about the present position with regard to the standard burner.

The Company's desire is to secure the most modern appliances for the credit of the Company and the engineering staff, and for the benefit of the consumers. The pursuit of this has led the Directors to the course they have now taken. The Corporation were made acquainted with the Company's intention very shortly after it was arrived at; and if, instead of devoting their time to seeking cause for opposition, they had sought an interview with the Directors, or had taken the trouble to ascertain, from those places where this burner has been in operation, whether it affected the gas consumers prejudicially, the result might have been a saving of public money. The Bill must now go forward, and be dealt with in due course by a Parliamentary Committee; and you may depend that these burdensome restrictions will be removed from gas companies.

They had received a copy of the petition which the Reading Corporation had presented against the Bill, setting forth the position the Council intended to take up. They made a number of suggestions which one would be inclined to smile at, were it not for the fact that it was rather serious to have the opposition of the Corporation of the borough. It was perfectly ridiculous to say that the Company wished to supply a bad article. What they had to do was to make their customers thoroughly satisfied with the quality and price of the commodity supplied. It seemed to be very undesirable that there should be different methods for testing the illuminating power of the gas throughout the country. The Company wished to have uniformity; and in order to do this, they had joined with a number of other companies so as to secure the new standard test-burner. He asked the Engineer to briefly explain the difference between the old and the proposed burner.

Mr. HELPS complied with the request, and said that to put obstacles in the way of the Company using the new burner was like insisting upon a 2-foot rule being used in Reading and a different rule in another town. He added, with all due deference, that the opposition was based upon something written many years ago, describing tests which were not carried out on scientific lines; and if the people who opposed the Bill had known what had happened since then, there would not, he thought, have been any opposition to the use of the burner, which had already been prescribed for use by more than 70 gas undertakings.

Mr. T. E. HEWETT seconded the resolution, and it was carried unanimously.

The meeting then closed.

WANDSWORTH AND PUTNEY GASLIGHT COMPANY.

Lowest Price of Gas in London and Suburbs—Fruit of Past Policy.

The Half-Yearly Meeting of the Company was held last Tuesday, at the Offices, Fairfield Street, Wandsworth—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. Chas. W. Braine) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, said it was a common saying at certain gatherings of a felicitous character that "it was the proudest moment of one's life." Without exaggeration, he thought he might use these words in his position as Chairman that day, because the report informed the proprietors that the Directors had been able to announce a reduction in the price of gas to 1s. 10d. per 1000 cubic feet from Christmas last. This in itself constituted the greatest pride and pleasure that any Board of Directors of a Gas Company could have. He would even face the proprietors without a dividend for such a piece of intelligence as that [Laughter]; but he was happy to say there was no fear of such a lamentable conclusion to their labours. The pride the Directors felt with regard to the position of being able to place the price of gas in the district at the low rate of 1s. 10d. (which was quite a record for London) was a matter in which their officers could also share, because it could not have been accomplished without their assistance. He was dwelling upon this inasmuch as the rest of the report was merely the usual history of continued unpretending, modest prosperity, coming from the hard work of the officers, and affording the present satisfaction and self-congratulation that the Directors felt, and especially felt he was sure by their colleague and former officer, who for many years worked in this undertaking and made these returns and the price of gas possible—Mr. Harry Freeman. This sort of thing was not done very easily; and it was not done shortly in a year or two. It meant many years' pursuit of a consistent and thorough policy—a policy carried out by capable, energetic, and careful hands; a policy initiated in part by gentlemen who could not that day share in their congratulations and felicitations, because they had been gathered to their fathers. But Mr. Freeman, who came into the service of the Company about 1869, became the chief officer of the Company when it was administered by two Directors who had left their mark on the history of the district, and especially upon the Company. He referred to the late Dr. T. S. Howell and the late Mr. Robert Jones (his own honoured father), who sat at Dr. Howell's right hand for many years, and who, by his technical skill, furthered the policy of strict economy in capital, and in the operations of every kind. As Mr. Freeman remembered, they were gentlemen who took no excuses of any sort whatever. They wanted the best possible from their officers; and the best was not too good for them. He had mentioned this because it was a very significant—a very proud—thing that this little Company (which was a very small concern compared with its gigantic neighbours) should be able to work so as to give the district Parliament had entrusted to it such a substantial benefit as gas at the present low price. The reduction of 1d. in the charge for gas represented to the consumers something like £2400 in the half year, or nearly £5000 a year. The consumers had a similar reduction last year; so that 2d. reduction in a whole year would give something like £10,000, by which the district benefited. That such a price was now possible was due to the fact that approximations to it were possible in the past—in other words, the present low price was due to the fact that low prices were possible in the past. This also was the reason why the dividends, if calculated upon the actual capital subscribed in the first instance, were handsome beyond (as Dr. Johnston would have said) "the dreams of avarice." He was not ashamed of the dividends. They were vindicated by the low price. Many years ago, he suggested to the Chairman of the Company he then served – the Commercial—that the day might be seen in London when a price of 18d. per 1000 feet of gas would be sufficient. The Chairman looked upon him with astonishment. But he (Mr. Jones) did not then look upon it, and much less did he do so now, as being so far away. It was indeed possible to now realize such an amount of business in the supply of fuel and power to engines that they already proximated that price. The price of 1s. 10d. was not the lowest charged by the Company. They gave discounts to people who used their gas for trade purposes and power; and this brought the price down to nearly 18d. The possibilities opened up to gas companies in the supply of gaseous fuel were great. There was no such thing as power without fuel, and this was where gas beat electricity. Gas was a fuel—an original source of power and heat. Electricity was only a method of communicating heat, which must be obtained from a furnace or waterfall or any other source of power, and then be communicated to the various services it professed to fulfil. Proceeding to the balance-sheet, he said the sale of gas had increased last half year by 5·8 per cent. This was rather better than the average increase in the Metropolis. The gross receipts were £1108 more, in face of the reduction of price by 1d. last year, which showed they had recovered from this concession. Residual products had not been selling quite so well; but there was only a small falling off in the receipts. Coal and oil cost something less, but not much. The Board viewed with great satisfaction the reports of the ending of the miners' disturbance over the precious Mines Regulation (Eight Hours) Act, which the gas companies did their best to prevent the Government forcing upon a lot of operatives who could get as much liberty as they liked without an Act of Parliament. They were glad to see the trouble was almost at an end, and that things were simmering down again. The profit for the six months was £1768 more than it was in the corresponding half of last year; it having then been £13,900, and now, in round figures, was £15,600. The cream to the proprietors (the low price was the cream to the Directors) was that this profit was more than sufficient to pay the statutory dividends applicable to the price of gas charged last year (1s. 11d.), and leave a balance of £1494 to carry forward. He would not go through the various items of the accounts. The main feature was that this profit had not been arrived at without amply providing for the upkeep of works and plant, repairs and renewal of mains, service-pipes, meters and stoves, and automatic meters and fittings. Upon all these, they

had spent the full amount to which they were entitled. Taking one illustration—works and plant—they had spent in this direction £11,950, whereas, in the corresponding period of the previous year, they spent £10,429; so that they had, in the past half year, spent £1500 more. When they saw this was done, proprietors in gas companies might know perfectly well that the profit was a genuine one, because of all the items that might be starved in order to show a profit, this was the one that a poor, unscrupulous individual who was hard-pressed might resort to. He concluded by formally moving the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Mr. T. A. Ives Howell) seconded the motion, which was unanimously carried.

The CHAIRMAN proposed the declaration of dividends at the rates per annum of £8 2s. 6d. on the "A" consolidated stock, £6 12s. 6d. per cent. on the "B" stock, and £5 13s. 9d. per cent. on the "C" ordinary stock. These dividends, he remarked, were 2s. 6d. more on the "A" and "B" stocks, and 1s. 9d. more on the "C" stock, than in the corresponding half of 1908.

The DEPUTY-CHAIRMAN seconded the motion; and it was unanimously agreed to.

Moved by the CHAIRMAN, and seconded by Mr. H. S. FREEMAN, the retiring Directors (Mr. E. R. Ransome and Mr. J. B. Howell) were re-elected; and on the proposition of Mr. J. C. POTTER, seconded by Mr. J. C. BADCOCK, C.B., the retiring Auditor (Mr. Frank H. Jones) was re-appointed.

Standard Burner Bill—Attitude of the Board.

A Special Meeting was then held for the purpose of considering, and, if thought fit, approving of the Standard Burner Bill, in the promotion of which the Company are joining.

The CHAIRMAN explained that, in the promotion of this Bill, the Company were merely a sort of partner. They found a number of companies were considering the question of adopting the best-found testing burner—a burner which, after being exhaustively tested by the scientific authorities who advise the Board of Trade upon gas matters, had been adopted for the Metropolis, and in all Gas Acts and Provisional Orders for some years past, a burner which (invented by the Engineer and now Chairman of one of the London Gas Companies, Mr. Charles Carpenter) had the merit that it did what no burner previously adopted by Parliament for testing gas accomplished, and that was it enabled them to ascertain not only that the illuminating power of the gas was right, but right exactly. That was to say, it not only tested correctly the 14-candle or 20-candle gas, as the case might be, that was prescribed in an Act of Parliament, but, when by any misfortune or accident the gas fell (say) somewhat below the prescribed illuminating power, or, on the other hand, if the gas, by some fortuitous circumstances, rose above the 14 candles, this burner would give the exact value of the deficiency or of the excess, whereas all burners that had been formerly in use for this purpose had the great drawback that they failed to test the gas accurately directly it became of a different constitution. Previous burners had a chimney which smoked painfully when there was the slightest excess of quality in the gas, and which made a dreadful mess of the testing when the gas was a slight degree below the quality they had to produce. The consequence was penalties were made to attach to any deficiency when the burner exaggerated the deficiency; and, on the other hand, the burner did not give the true value of any excess that, on another day, might be held to counterbalance the deficiency on the prior test. For the elucidation of the matter to the proprietors, he had been using homely language and explanation. He was sorry to say that since this group of companies got together, through an Association who had done him the honour of putting him in their chair (the Gas Companies' Protection Association), the innocent proposition to make this good burner the standard for these companies had raised much opposition; and a number of petitions had been formulated against the Bill which actually made his hair stand on end when he looked at them. He had been under the impression the companies were doing a comparatively innocent thing; but the local authorities seemed to think otherwise. With regard to the Wandsworth Company, the burner they had was nearly as good as the new one; and their conduct was so regular, and they did not often have variations in the quality of their gas, that the Directors could hardly be said to be anxious to participate at all. But out of loyalty and sympathy, and in order to assist in getting on a level footing in the matter of testing in the gas industry, they had thought it desirable the Company should go in with the others. But now many of the local authorities concerned had lodged these petitions. The Wandsworth Borough Council, who had always worked on the best of terms with the Company—they were an enlightened Council, they appreciated the reductions made by the Company in the price of gas, and they were extremely fair and easy to get on with, understanding the Company's aims and willing to back them up in them—were not, he noticed, going to ally themselves with this common attack, which would ultimately make him fear that, as Chairman of the Gas Companies' Protection Association, he was going to be burned at the stake for his malefactions. He had only to say with regard to the Bill that the proprietors would trust the Directors to this extent—that directly there was any fear of the Authority exciting themselves too much in this small matter, they would propose to make a present of the whole matter to them, and say: "We had no idea we were going to raise your tempers and apprehensions to this extent, and so we will make a present to you of the whole matter, and drop it altogether." He thought he could tell the proprietors that would be the spirit in which the Directors would deal with the question if it came to the point of a Parliamentary Committee suggesting whether, as there were so many enemies, it would not be better to concede something to them. They really could not afford to have the price of gas forcibly altered, or tests or penalties attached to various things, or other burdens placed upon them. That was the position the Directors would take up in this matter; but at the same time he must ask the proprietors to give them authority to participate in prosecuting the Bill. He therefore moved—

That this meeting having considered the Bill now pending in Parliament, intituled "A Bill to provide in the case of certain gas companies for the adoption of the Metropolitan argand burner No. 2 as a standard burner, in substitution for the various burners now in use for the official testing of the illuminating power of gas supplied by them and for other purposes," hereby approves the same, subject to such additions, alterations, and amendments as Parliament may see fit to make therein.

And, added the Chairman, subject to the fact that the Directors would, if there were any attempt to make too many alterations, draw back, and have things left as at present.

Co-Partnership.

A PROPRIETOR reminded the Chairman that, at the last meeting, he had mentioned the subject of co-partnership, but had not said anything on this occasion.

The CHAIRMAN thanked the proprietor for reminding him of the subject. They had, he said, been treating their men on certain liberal terms, which did not exactly correspond to profit-sharing. But the Board had drawn up a scheme; and it would be ripe to submit to the men within a few days. At the last moment, one of the Directors, who was a very careful, searching, and thoughtful investigator of these matters, suggested that certain conditions of the scheme were a little too loosely drawn. He (the Chairman) had looked into the question, and agreed with his colleague's view. This was the reason he was not able that day to present to the proprietors an exact and completed scheme. They were, however, prosecuting the matter; and in a week or two, the scheme would be quite ready. It would treat the men liberally. It would start with a standard price approximately that they were now charging. So long as their employees enabled them to charge a low price for gas, the scheme would be as profitable to them as the best of the schemes that had been put into operation by the companies round about them. The Board had not lost sight of the matter, and they were well aware of its value.

A vote of thanks, embracing the Chairman and Directors, the Secretary (Mr. C. W. Braine), the Engineer (Mr. H. O. Carr), their staffs, and the workmen generally, concluded the meeting.

GAS COMPANIES AND THE PORT OF LONDON RATES.

Board of Trade Inquiry.

At the Westminster Palace Hotel, last Thursday, Viscount ST. ALDWYN opened an inquiry, on behalf of the Board of Trade, in regard to the Draft Provisional Order embodying the schedules of maximum port rates for goods which has been prepared by the Port of London Authority in accordance with section 13 of the Port of London Act, 1908. There was a very large attendance of counsel, agents, and parties interested; no fewer than 223 objections having been presented.

In the course of the proceedings, which had reference exclusively to procedure,

Mr. FREEMAN, K.C., who appeared for various Gas Companies, including the South Metropolitan and Commercial, asked that the objections should be tabulated and grouped by the promoters, and furnished to the parties, as had been done in several previous inquiries.

This request was supported by other counsel; and on the suggestion of the Chairman,

Mr. J. D. FITZGERALD, K.C., who appeared for the Port of London Authority, undertook to do what he could in the matter, in consultation with his learned friends, before the next meeting.

Mr. FREEMAN also asked whether the schedules represented suggestions of the Port Authority, or were only the provisional opinion of the Board of Trade as to what they should be. If they were merely suggestions which did not commend themselves to the Board of Trade, the parties might be spending a long time framing maximum rates which were never seriously intended to be enforced.

Mr. CLODE, on behalf of the Board of Trade, said that, in the ordinary course, they were, no doubt, responsible for the Provisional Order; but they had felt all along that the burden of proof rested upon the Port Authority. At this stage of the proceedings, therefore, and seeing that hereafter they would have to settle the form of the Order and the specification promoted in Parliament, they did not come to the inquiry as partisans, but rather adopted an indifferent attitude, and would watch the proceedings, not coming into the arena on behalf of one side or the other. When the inquiry had been held and the report issued, the Board would have to make up their minds upon the form of the Order to be adopted, both as to its provisions and the schedules. It would be for them to take upon themselves the responsibility.

The inquiry was then adjourned.

It was announced that the sittings would extend over Monday, Tuesday, Thursday, and Friday this week, and the same days next week; and further hearings may be necessary.

London County Council and the Standard Burner Bill.

At to-day's meeting of the London County Council, the Parliamentary Committee will report that they have had this Bill under consideration; and they add: The Wandsworth Metropolitan Borough Council have expressed the opinion that an amendment should be sought in the Bill to provide that in future the gas supplied by the Wandsworth and Putney Gas Company (one of the promoters of the Bill) should be tested by the Council instead of by the Borough Council. The Public Control Committee support the view of the Borough Council, and have asked that the necessary steps be taken to secure the insertion of the amendment in the Bill. The present law provides that testing-places shall be maintained by the Borough Council, and the fittings and apparatus by the Company. The Public Control Committee are of opinion that this arrangement should not be disturbed in any new legislation, and that the Council should bear only the expenses of testing and control. The total cost to the Council of testing under this arrangement—if daily tests were made—would, it is understood, not exceed £208 a year. The Committee recommend that an amendment be sought in the Bill to provide that the gas supplied by the Wandsworth Company should in future be tested by the Council instead of by the Wandsworth Council.

PROVINCIAL GAS AND WATER COMPANIES.

Gas.

Suggested Extensions at Barnstaple.

Two points of a gratifying character were commented upon at the recent annual meeting of the Barnstaple Gas Company—an increased make of gas per ton of coal carbonized, and a larger consumption. Mr. C. E. Roberts Chanter, who occupied the chair, said the revenue for the year was £10,084, which was £264 more than in the previous year, principally due to increase in the private lighting. From public lighting the revenue was £50 less than in the previous year. The expenditure—£7980—showed an increase due to a large outlay on relaying mains. The coal bill was £200 less, owing to the satisfactory way in which the Directors were able to place contracts. As they had made more gas and carbonized less coal than in the previous year, the working results were most satisfactory. The number of consumers increased from 1840 to 1924 and the number of stoves on hire from 852 to 902. Though they had experienced the loss of a large consumer and of a considerable portion of the revenue from the public lamps, and had the competition of the electric light, it was gratifying to find a larger output than during the year 1908. Their satisfactory position was largely due to the Manager and Secretary (Mr. F. L. Schofield); and the Directors wished to congratulate him. The report and balance-sheet were adopted, and the dividends recommended declared; making for the year 10 per cent. on the "A" and 7 per cent. on the "B" shares. Mr. A. H. Copp asked if the Directors had taken into consideration the question of extending the mains to places outside the present area of supply. The Chairman replied that, in view of the probability of the Barnstaple Water Company's mains being extended to Instow, the Directors had under consideration the possibility of taking the gas-mains to Bickington and Fremington; there being a growing demand in this direction.

Large Half-Year's Increase at Bromley.

At the half-yearly meeting of the Bromley and Crays Gas Company last Tuesday, the Directors reported that the make of gas in the six months ended the 31st of December showed an increase of 7,322,000 cubic feet, or nearly 3½ per cent., compared with that in the second half of 1908. They stated that all the works rendered necessary by the decision to concentrate the manufacture of gas for the whole of the amalgamated district at the Bromley works (as mentioned in their report a year ago) had been completed, and were giving every satisfaction in operation; reflecting much credit on the various Contractors and upon the Chief Engineer (Mr. William Woodward), who had directed the work. Since the 1st of January last, when the manufacturing plant at the Cray works was shut down, all the Company's district had been supplied from Bromley; and it already appeared as if the economies predicted as likely to result from this policy were in a fair way to be realized. The Directors had decided, subject to the approval of the meeting, to pay to the Secretary (Mr. H. W. Amos), by way of gift, a sum of 50 guineas in recognition of special services rendered by him in the process of the amalgamation of the two Companies. The accounts accompanying the report showed that the revenue for the half year was £43,348, and the expenditure £32,553; leaving £10,795 to go to the profit and loss account, the balance on which available for distribution was £11,660. The Directors recommended the declaration of dividends under the sliding-scale at the rates of 6 per cent. per annum on the "A" ordinary stock, 4½ per cent. per annum on the "B" ordinary stock, and 5½ per cent. per annum on the "C" ordinary stock (all less income-tax). These would absorb £9261, and leave a balance of £2399 to carry forward. In the absence of Mr. Alexander Dickson, the Chairman of the Company, in South Africa, the Deputy-Chairman (Mr. B. H. Latter) presided. In moving the adoption of the report, he referred at length to the alterations made in the manufacturing plant, and to the adoption of apparatus for the production of carburetted water gas. He pointed out that the construction of fresh works, even of the magnitude of their own, required considerable foresight in their planning and assiduous supervision in their erection on the part of the responsible official; and in these respects the Directors would commend to them the excellent work put in by the Chief Engineer, who had faced a heavy task with characteristic courage, watchfulness, and ingenuity, and had completed it with what promised to be a full measure of success. The chief Contractors also—Messrs. Humphreys and Glasgow—might be commended for the thorough, conscientious, and punctual performance of their contract. Having briefly referred to the proposed gratuity to the Secretary, he turned to the accounts, and thought the shareholders might congratulate themselves upon having had a successful half year. As to the future, it was dangerous to "prophesy smooth things," in view of the troubles arising out of the Eight Hours Act; but he thought they might look forward with a fair amount of assurance to the coming year. The report was adopted and the dividends recommended were declared. The thanks of the meeting were warmly accorded to Mr. Latter for presiding; and he, in replying, spoke of the excellent work of Mr. Woodward, Mr. Amos, and the staff. Mr. Woodward and Mr. Amos replied.

Disturbing Elements but Good Working at Chichester.

The accounts presented at the half-yearly meeting of the Chichester Gas Company last Friday showed a sum of £2274 available for distribution; and the Directors recommended dividends for the past six months at the rates of 10 and 7 per cent. per annum on the several stocks, less income-tax. In their report they mentioned that the Company had had to meet the competition of the Electric Light Company established in the city, which had resulted in a slight decrease in the consumption of gas. The Engineer (Mr. T. Ebenezer Pye, F.C.S.) reported that the works and plant were in a thoroughly efficient condition. In the absence, through illness, of the Chairman of the Company (Mr. Alfred Lass), Mr. W. A. Walker, of Worthing, presided; and, in moving the adoption of the report and accounts, he stated that in the past half year there had been a slight decrease per ton in the cost of coal carbonized compared with the corresponding period of 1908, but that an increased sale of gas per ton had been realized. He gave the following particulars in regard to the working: Gas made, 12,050 cubic feet per ton; gas sold, 11,007 cubic feet per ton; coke produced, 12½ cwt. per ton; coke used for fuel, 21·81 per cent. of the make; tar made, 11¼ gallons per ton; and sulphate of ammonia made, 21·48 cwt. per 100 tons of coal. Of the total quantity of gas made, 91·34 per cent. was sold, 1·75 per cent. was used on the works, and 6·91 per cent. in the offices and show-room and unaccounted for. The income and growth of the business had been somewhat affected by a decrease to the extent of 868,000 cubic feet in the quantity of gas sold, and a fall in the prices realized for coke and other residuals. These disturbing elements had been caused by the introduction of incandescent lighting in place of the flat-flame burners, the general depression in trade, and the competition by the Electric Light Company. In this connection, he emphasized the economic value of inverted incandescent burners, the cost of which was, he said, so small as to be beyond the reach of competition. The profit realized on the half-year's trading (£1827) was more than sufficient to pay interest and dividends. The Chairman concluded by referring to some installations of lighting and heating which the Company had carried out at the Cathedral and other places. The report was adopted, and the dividends recommended were declared. A vote of thanks having been passed to the Chairman for presiding, Mr. Walker, in responding, cordially thanked, on behalf of the Board, the Engineer, the Secretary (Mr. Victor V. Vick), and the other members of the staff and the employees for their excellent and efficient services during the half year. Mr. Walker stated that the working results which had been submitted to the proprietors would compare favourably with those of any up-to-date gas undertaking in the country, not only of the same size, but of much larger capacity—and he was speaking from forty years' practical experience in the gas industry. Mr. Pye, in acknowledging the vote, emphasized the determinatfon of the staff to do their utmost in the service of the Company and of the public of Chichester. He said the popularity of gas in the city would continue to increase if only the customers would take the management of the Company into their confidence. Mr. Vick also thanked the meeting, and testified to the pleasure the staff experience in the service of the Company.

A Disappointing Season at Felixstowe.

Presiding at the recent annual meeting of the Felixstowe Gas Company, Mr. Samuel Alexander said the past year had been a disappointing one to all seaside places; and the effect of the year coming upon the previous bad year, had led to their sale of gas being disappointing. They had nearly maintained the make and sale of gas compared with the previous year; but the steady progress of the last few years had now received a check which they trusted during the coming twelve months would be rectified. They hoped this year to see another considerable increase in the consumption of gas. Though the make and sale had not been so much, the cost of production had been only slightly less; and their leakage during the last year had been the lowest since the Company was established. The number of customers had steadily increased, until now there were 1276 on the books, which was more than double the number they had ten years ago. The principal item in the balance-sheet was the heavy increase that they had incurred with regard to the extension of the works. The works were established 22 or 23 years ago, and had become almost obsolete; and it was necessary that they should rebuild and remodel them on up-to-date principles. This had cost money; but the result would be very satisfactory in future years. One of the most gratifying things he had to bring to their notice was the request from the Council to light the new pavilion with gas. It was most successfully done; and the Company and their Manager (Mr. F. Paternoster) had been complimented on the success of this installation. The lighting of the pavilion cost the Council less money than it cost them the previous year to light the band-stand alone with electricity. Therefore they were not only providing an excellent light, but a cheaper illuminant than the Council had had before. [An illustrated description of the pavilion gas lighting will be found in the "JOURNAL" for June 29 last, p. 961.] It was stated in the report that the revenue account, after applying £337 (about 1 per cent. on the capital) to the renewal account, showed a profit of £1958, from which amount provision had been made for interest on debentures, dividends on preference stock, and income-tax. It was the Directors' intention to extinguish the balance of the renewal account by a similar sum annually. The necessity of appropriating the sum mentioned to the renewal account compelled the Board to recommend a somewhat reduced dividend; and they proposed to declare a final payment for the year at the rate of 9 per cent. on the "A" ordinary stock, and of £6 6s. per cent. on the "B" ordinary stock—making a total distribution of 8½ per cent. and £5 19s. per cent. respectively, both less income-tax, and leaving a balance of £957 to the credit of the profit and loss account. This distribution, added to that of the two previous years, made an average return of 9½ per cent. on the original stock for the past three years. At a subsequent extraordinary meeting, a resolution was passed authorizing the raising of further capital.

Slot-Meter Consumption and High-Pressure Lighting at Ipswich.

The accounts presented at the annual general meeting of the Ipswich Gas Company on Monday last week showed a balance, after payment of the interim dividend, of £12,038; and the Directors, in their report, recommended that a further dividend, at the full statutory rates, should be paid, less income-tax. There would then be a balance of £5908 to carry forward. The Chairman (Sir Daniel F. Goddard, J.P., M.P.), in moving the adoption of the report, expressed his pleasure in coming before the shareholders with his brother Directors and recording another prosperous year in the undertaking. There was very little in the accounts that called for remark, as they might almost be regarded as normal; and he thought they were very satisfactory. The item in the revenue account of £12,068 for maintenance was an unusually large sum, and was due to the fact that they had been compelled to rebuild the old retort-house, which had been in existence 32 years. Referring to the general subject of the business, the Chairman said there were in Ipswich about 18,000 dwelling-houses, and of these 15,000 were being supplied with gas, which was a very large proportion. It was due to the introduction of the slot-meter, as there were 11,000 consumers on the prepayment system. It was a good line of business which they liked to encourage, because about half of these

consumers used stoves. It had so increased of late that one-third of the gas in the town was consumed through slot-meters. Another part of the business which had improved very much, and for which the expenditure of capital was partly responsible, was the high-pressure lighting. Mr. Jolliffe (their Secretary and Engineer) laid it before the Board, and urged its adoption, and they consented to a high-pressure main being laid. So successful was this method of lighting, that they had determined to extend it. Messrs. Ransomes, Sims, and Jefferies were the first to adopt the high-pressure system; and they found it so satisfactory that they had extended it to several parts of their works. The Directors hoped soon to have 70 of the public lamps lit on this system, under which they were able to give 60-candle light from every cubic foot of gas, whereas the ordinary incandescent burner gave only 17 candles. Thus the lighting of the town had been greatly improved without adding to the cost. The Chairman concluded with a few remarks on the Company's superannuation and sick funds, which he said should prove of great value to their workmen. Mr. W. Alexander, in seconding the motion, remarked that the Chairman had omitted to mention that the private lighting rental had increased by £2000. The report was adopted, and dividends at the rates of 13, 10½, and 10 per cent. per annum were declared. An extraordinary meeting was then held at which sanction was given to the association of the Company with other gas companies in the promotion of the Gas Companies (Standard Burner) Bill; and the proceedings closed with votes of thanks to Mr. Jolliffe, the staff, and the Chairman.

A Record Sale per Ton at Longwood.

In moving the adoption of the report and accounts at the annual meeting of the Longwood Gas Company, the Chairman (Mr. Robert Thornton, J.P.) remarked that the leakage during the past year had been rather higher; but this he attributed largely to the heavier road traffic, and the increased vibration to which the mains were now subjected. He stated that the quantity of coal carbonized had been 10,950 tons, from which a make of gas equal to 10,401 cubic feet per ton had been obtained. This spoke well for the new regenerative settings that were installed eighteen months ago. The report (which was adopted) stated that the alterations in the carbonizing plant last year had resulted in the more economical production of gas. The sales of gas showed a slight increase; and considering the industrial conditions, this was regarded as satisfactory. The number of lighting and heating appliances on hire at the end of the year amounted to 1994; while the Company had 5600 meters in use. A dividend at the rate of 3 per cent. on the consolidated ordinary stock was declared, making, with the interim dividend, 5 per cent. for the year. It was pointed out by one speaker that the gas sold per ton of coal, notwithstanding the greater leakage, was considerably higher than in any previous year. The Chairman was thanked for his services; and, in responding, he proposed a similar vote to the Engineer, Secretary, and Manager (Mr. J. H. Brearley) and the staff. Their Manager had, he said, devoted himself heartily to their service. He was a man of no mean ability, and held a high standing in the gas profession. The Directors had the utmost confidence in him. In acknowledgment, Mr. Brearley paid a high tribute to the junior officials of the undertaking.

Newmarket and the Standard Burner Bill.

The Directors of the Newmarket Gas Company, in the report which was adopted at the annual meeting last week, stated that the net balance of profit earned during 1909 was £4376; and a balance had been brought forward from the previous year of £2649. Deducting the debenture interest, a sum of £6863 remained to the credit of the profit and loss account; and it was recommended that this should be appropriated as follows: A dividend at the rate of 6½ per cent., £3672; to insurance fund, £600; balance carried forward, £2591. The Company had, in co-operation with 48 other gas companies, deposited a Bill in Parliament for the purpose of authorizing the new "Metropolitan" argand burner No. 2 as the standard burner for the official testing of the illuminating power of the gas. This was the burner prescribed in the Model Bill by Parliament. The Chairman (Mr. R. Stephenson, J.P., D.L.) pointed out that the £600 which they were carrying to the insurance fund this year would make the fund £1970. The fund must be brought up to £3000; but this he thought it would take two or three years to accomplish, since they would have next year to renew some retorts. Then, perhaps, in another two or three years they hoped to be able to take another 2d. off the price of gas, which would enable them to pay a further ¼ per cent. dividend. At the conclusion of the ordinary meeting, a special meeting was held, at which a resolution was carried approving of the Standard Burner Bill.

A Favourable Balance-Sheet at South Shields.

The Chairman (Dr. J. F. Armstrong, J.P.), in moving the adoption of the report and accounts at the annual meeting of the South Shields Gas Company, remarked that the balance-sheet was one of the most favourable ever issued by the Company. Referring to improvements carried out during the year, he said that at Jarrow they had done little else than repair and replace worn-out retorts to enable gas to be produced in the old way. During the year the Board had completed negotiations for the Shields works to have direct railway communication with the North-Eastern Railway for all materials other than coal. The railway communication necessitated a certain amount of plant being installed for the lifting of coke from the low-level coke-yards, and delivering into trucks on the high-level sidings; and the Board decided to instal a complete coke-handling plant for the removal of the hot coke from the Shields inclined retort-house, and delivering it into stock in the yard, and breaking, screening, and storing it in elevated hoppers for the loading of carts, thereby reducing the manual labour hitherto required. Favourable coal contracts were made by the Directors going into the market a little earlier than usual; and, as a matter of fact, the price of gas coal had been higher ever since. The putting into operation of the Mines Eight Hours Act had been a source of anxiety to the Board for some months; and, in anticipation of probable trouble and stoppages at some of the collieries, heavy stocks of coal at contract prices were accumulated last autumn, both at the South Shields and Jarrow works. This course had obviated, so far, the necessity of purchasing any coal at the present enhanced prices; but if this forethought had not been exercised, the year's coal bill would have suffered. Having regard to the state of trade last year, particularly in shipbuilding, on which the district so much depended, the smallness of the decrease in gas bills was agreeably surprising. As a matter of fact, the whole of the decreased consumption took place in Jarrow. The total income for the year was £89,717, against £91,419 for 1908, a decrease of 1·86 per cent. The saving under the heading of coal, oil, &c., was £3573. The decrease in the expenditure was £1521; the total being £68,114, as compared with £69,635. It would be noted that the carry-forward was increased from £7675 to £8325, and at the end of 1909 amounted to about the equivalent of a half-year's dividend. The report was adopted; and dividends were declared on the consolidated and new stock of the Company of 4 per cent. for the half year (which, with the interim dividend, made 8 per cent. for the year), and of 2¾ per cent. for the half year on the ordinary stock (making, with the interim dividend, 5½ per cent. for the year).

A Satisfactory Increase at Tynemouth.

Addressing the shareholders at the forty-fourth annual meeting of the Tynemouth Gas Company, the Chairman (Mr. J. B. Williamson, J.P.) said that, both as regarded the manufacturing and the financial results, 1909 had been in every way an encouraging year; and there could be no doubt that the low price of 2s. per 1000 cubic feet at which the gas had been sold had materially helped to increase the consumption. The make of gas was 24½ million cubic feet over that of the preceding year, representing an increase of slightly over 5 per cent. The price of coal had been fairly favourable. Coal had cost £2929 less than in the previous year; and while this was partly due to the lower price paid per ton, it was largely owing to the better results obtained in the retort-house. Though the make of gas had increased by 24½ million cubic feet, only 324 tons more coal had been used. The old retort-house was finally closed-down about a year ago; and since then the whole of the gas had been produced in the new retort-house, with the result that they had obtained 11,430 cubic feet of gas per ton of coal carbonized—an increased yield of 468 cubic feet over the previous year. The coke sold per ton of coal was 10·91 cwt., against 10·19 cwt. Sulphate and tar both showed a slightly increased yield per ton of coal. The gas made, the gas sold, and the coke sold per ton of coal carbonized were all records over the best results of any previous year, and were all due to improved plant and conditions of working. The total revenue for the year was £73,402, and the expenditure £61,041—leaving a balance of profit of £12,361. Adding £7718, the preceding year's balance, gave £20,080 to be dealt with. The maximum dividends on the preference and ordinary stock absorbed £11,209. Then they proposed to add £1500 to the reserve fund, and carry forward to next year £7371. During 1909, the number of new customers added was 582, making a total on Dec. 31 of 19,614. Of these, 11,980 were penny-in-the-slot customers. The slot-consumers had 5648 cooking stoves in use, equal to nearly half the number of slot consumers; and the ordinary consumers had 2977 stoves of various sizes. In addition, there were now quite a large number of heating-stoves, radiators, water-heaters, &c., in use. The total revenue from gas was £49,805; and of this sum over £20,000 was collected from the slot-meters. The report was adopted.

Water.

A Progressive Company.

Presiding at the half-yearly meeting of the Colne Valley Water Company on Feb. 15, the Chairman (Mr. C. E. Keyser) stated that the total water-rates for the half year to Dec. 31 was £22,665, as compared with £23,172 for the corresponding period of 1908, or a decrease of £507. The decrease for the first six months of the year was £286; so that the total for the year was £794. This was due to the fact that this was the first year they had been charging under the new scale of rating. While the Company had lost a considerable amount under the new scale, it was satisfactory that it worked out to such a small deficit as they were able to show on the gross receipts. The total number of new supplies added was 554; and the estimated annual water-rental was £1295—being a total for the whole of 1909 of 1085 additional supplies, with an estimated water-rental of £2538. For the three previous years the corresponding figures were: 1906, 939 supplies; estimated rental, £2640. 1907, 1082 supplies; estimated rental, £2921. 1908, 995 supplies; estimated rental, £2516. Of course, all these amounts were calculated on the old scale of charges. There were now over 18,000 connections with the Company's mains; and the population supplied was above 100,000. These figures were just about double what they were ten years ago. The increase in expenditure was only £333, as compared with the corresponding period of 1908, notwithstanding that £207 was paid for gratuities to the staff in commemoration of the first payment on account of back-dividends. The new softening reservoir and lime-tanks were practically completed and brought into use this month. These would greatly facilitate the softening of the water, and effect a considerable saving in working expenditure. The remainder of the capital authorized to be issued having been raised, the proprietors were to be asked to authorize a further £25,000, to be issued as required. It was not anticipated that the Company would want it for a year or so. The actual price received for the last issue of stock was £168 4s. 6d. per cent. The Stock Exchange quotations for the Company's stock had risen considerably the last few weeks. The original stock had advanced 13½ per cent., and was quoted at 270-75. The "B" stock—the old 7 per cent.—had risen 13 per cent., and was now quoted at 184-86. The "C" stock had risen 14 per cent., and was now quoted at 250-55. The item of rates was getting a very severe one; amounting now to something like one-eighth of the gross receipts. He moved the adoption of the report and accounts. Mr. A. Helsham-Jones seconded the motion. Mr. W. B. Bryan congratulated the Directors and officials on the fact that the working expenses were less than 40 per cent. of the gross revenue. In the case of companies who obtained their water by pumping, if the working receipts were anywhere in the neighbourhood of 40-44 per cent. of the gross revenue he considered it very good. The Chairman remarked that it might interest Mr. Bryan to know that in 1908 the percentage of working expenses to gross income, when they were getting higher rates for the water, was 35·70. Mr. Bryan: I believe you have beaten everybody. The motion was carried unanimously. Authorization was given to the payment of the full statutory

dividends at the rates of 10 and 7 per cent. per annum, on the several classes of ordinary stock, and, in addition, a payment of 1 per cent. actual on account of back-dividends. The retiring Directors and Auditor were re-elected, and then an extraordinary meeting was held, at which the Directors were empowered to issue further capital in accordance with the remarks of the Chairman.

Depression in Trade at Newcastle.

The sixty-fifth annual report of the Directors of the Newcastle and Gateshead Water Company was adopted at the meeting last Tuesday. It stated that the gross receipts for the year to Feb. 1 amounted to £188,097; and the expenditure on working, including management and maintenance, was £45,289. This left a balance of profit of £142,808, to which had to be added the sum of £2820 brought forward—making a total of £145,628. The interest and dividends recommended would leave a balance of £1617 to be carried forward. The domestic rental showed the satisfactory increase of £3663 over the previous year; but, on the other hand, there was a reduction of £2413 in the revenue derived from trade supplies and miscellaneous receipts, owing to the restricted consumption of water by manufacturers during last season—chiefly due to the prolonged depression in trade, the recovery from which was as yet very partial. The increasing use of electric instead of steam power, also, necessarily diminished to some extent the use of water for manufacturing purposes. The trade outlook now appeared more hopeful on the Tyne; but at the present moment progress was being, in many cases, retarded by the disputes in the coal trade in Northumberland and Durham. The total population now being supplied was estimated at about 570,000. This number included the urban districts of Blaydon and Ryton, which prior to last year were supplied by their respective Councils. Notwithstanding the necessary additional expenses incidental to the above change, the expenditure on revenue account would have shown a satisfactory decrease on the year, but for the fact that the amount paid in rates again neutralized the saving effected. Apart from extensions of street and service-pipes, the capital expenditure amounted to £11,513. The expenditure on capital account would in future be greatly restricted, in view of the very satisfactory position which the Company had now attained with regard to their resources to meet future requirements of the district. The Chairman (Mr. W. D. Cruddas, J.P., D.L.) pointed out that the decrease of £2413 in the revenue for water for trade purposes arose through the consumption having been 82 million gallons less than in the previous year. Dividends were declared at the rate of 5 per cent. per annum on the preference stock; at the rate of 8 per cent. per annum for the half year on the original stock, making (with that paid in August last) 7½ per cent. for the year; and at the rate of £5 12s. per cent. per annum for the half year on ordinary stocks under the Acts of 1876 and 1898, making £5 1s. 6d. per cent. for the year.

Increase in Rates and Taxes in South Staffordshire.

The opinion was expressed by Alderman C. G. Beale, in presiding over the half-yearly meeting of the South Staffordshire Water Company, that the proprietors could not in any great sense congratulate themselves on the past six months' operations, because on both sides of the account the results were far from being satisfactory. In fact, the report was much the worst that the Directors had put before the shareholders. The revenue from domestic supplies had increased by £940, but that from water for trade purposes had fallen off by £914. Trade had undoubtedly been bad; but he was afraid the Company had lost two three large customers who had adopted electrical power, or some other means which had enabled them to dispense with a great deal of water they had previously taken. Rates and taxes showed an increase; and they were going to be very much more. There had been a re-assessment in part of their district; and next half year there would be an additional charge. At present, they were paying more than 10 per cent. of their gross receipts in rates. The report (which was adopted) stated that the number of houses laid on during the half year ending Dec. 31 was 1208, making the total supplied 138,178. The gross amount of water-rates was £72,981, as against £72,955 in the corresponding period of the previous year. The Directors had transferred the sum of £2000 to the depreciation fund, thus raising it to £33,753. After providing for interest on debenture stock and dividend on the preference stock, the amount remaining for division (including £8056, the balance brought forward) was £29,023; and the Directors recommended the declaration of a dividend for the six months on the ordinary stock at the rate of 6½ per cent. per annum, less income-tax. The amount of this dividend being £20,894, there would remain £8129 to the credit of the next half year.

Truro Water Company's Past Difficulties.

In his speech at the half-yearly meeting of the Truro Water Company, Mr. A. C. Willyams, the Chairman, referred to the trouble experienced last summer with reference to the question of the purity of the water. Analyses had been made, some showing good and some bad results. The Directors had maintained that the water was contaminated in the mains owing to the old ball hydrants in the streets; and he was glad to say that the City Council were now replacing them by spindle hydrants. Trouble had also arisen with reference to the pollution of the stream. The Directors had done what they could to remedy this; and they believed that improvements might be carried out which would prevent the possibility of any contamination in the future. Owing to the dry weather experienced, the supply of water was short during some of the summer months; but the domestic supplies were not curtailed. With regard to the balance-sheet, the income from domestic and meter supplies well held its own; but they had a larger expenditure on rates and taxes. The balance for the half year was £892; and the total amount to the credit of the profit and loss account was £2019. After payment of a dividend of 5 per cent., there would be £1619 to carry forward. Mr. Danbuz, in seconding the motion for the adoption of the report, said that although the quantity of water pumped during the half year was 5 million gallons less than in the corresponding half of 1908, there was no diminution in the supplies for domestic purposes. The motion was carried, and the dividend recommended declared.

GAS EXPLOSION AT MANCHESTER.

A Bridge Damaged.

A bridge which spans the River Medlock in Mill Street, Manchester, was the scene, in the early hours of last Wednesday morning, of an explosion of gas which caused considerable havoc. A great rent was made in the roadway; about 30 feet of a wall by the gates leading into Phillips Park was blown into the river; the bridge itself was rendered impassable; and the supply of electricity to the district and for the tramway service was interfered with for nearly two days.

It is a very old bridge; and under the surface of the roadway were three sets of pipes, one for gas, another for water, and the third containing the electric cables. On Tuesday, workmen had been engaged repairing the roadway; and it is surmised that the gas-main was injured on being reached. When work was suspended for the night, some of the workmen detected a slight smell of escaping gas; and the fracture must have increased as the hours went by. At any rate, about half-past one on the Wednesday morning, there was a loud explosion; the escaping gas having become ignited by some means—probably from the flame of the night-watchman's lamp, though this was some considerable distance from the bared gas-main. There was no one about at the time; and the night-watchman was not injured.

The gas from the broken main was allowed to burn until the pipe could be plugged between the place of fracture and the Bradford Road Gas-Works, distant 300 yards from the scene of the explosion. Some people visiting the place early, could not understand why the gas was allowed to burn, and not turned off. Had any other action been adopted, there might have been a second and much more serious explosion, owing to the mixture of air and gas in the main. After the pipe had been plugged at some distance from the fracture, the gas remaining in it soon burned itself out, and all danger of a second explosion was averted. At almost all bridges within the Manchester gas supply area there are valves on each side of the structure, so that the gas may be turned off when anything happens; but this bridge in Mill Street, being a very old one, has not got these valves.

GAS AND ELECTRIC LIGHTING AT BISHOP'S STORTFORD.

The Urban District Council of Bishop's Stortford recently had a long sitting at which the question of the lighting of the town was fully considered. Mr. J. L. Glasscock, the Chairman, presided.

The first matter was the presentation of a report by the Electric Lighting Committee, in which they stated that the Clerk (Mr. T. Swatheridge) had had an interview with one of the officials of the Board of Trade with reference to the position of the Council in regard to their Electric Lighting Order, and that he had been informed that the Council had absolutely no power to transfer it to anyone. It was for them to carry it out, or it would be revoked. He was also informed that if there was any intention on the part of the Council to proceed with the Order, they should lodge a petition against the Amalgamation Bill promoted by the Gas Company. The Clerk explained that if the Order was revoked, the electric lighting would be entirely in the hands of the Gas Company if their Bill passed; and therefore he expressed surprise that the Council had not deposited a petition against it. After some conversation, the report was adopted.

The Council then considered in committee the report of the deputation appointed a few weeks ago to wait upon the Clerk to the County Council (Mr. C. E. Longmore) with regard to opposing the Gas Company's Bill. On resuming, the Chairman reported that it had been decided to petition against the Bill so far as the electricity clauses and the ratio of prices to be charged in the inner and outer area were concerned. He moved that the action of the Committee be confirmed. The motion was carried *nem. dis.*; and the Chairman was empowered to affix the seal of the Council to the petition.

Mr. Carruthers then moved—"That this Council, having considered the report of Messrs. May and Hawes [the Council's Consulting Engineers], do hereby resolve that steps be taken to lay an installation of electric lighting, &c., in the district of Bishop's Stortford, on the lines indicated in the report." He said there were, among others, three main questions which demanded their serious consideration. "First, was there a need and demand for electric light and power; secondly, if there was, who were the best to supply the demand, a private Company or the Local Authority; and, thirdly, if there was a demand, and the Municipality was in the best position to supply it, then was there a prospect of it proving a financial success?" He offered a few remarks on all of these questions, and concluded by saying the scheme which had been submitted to the Council had been carefully prepared, and involved but a comparatively small capital expenditure. The present was a most favourable time for the establishment of an electricity supply undertaking, as it was well known that market prices were extremely low, and that plant, mains, and apparatus of the highest quality could be purchased on most favourable terms.

The motion having been seconded, Mr. Holland said he should vote against the resolution, simply on the ground that he believed the best interests of the town would be served by the Council going on the lines followed for the last few years, and doing the best they could with very careful regard to their expenditure. He was convinced that lighting by electricity would, instead of resulting in a success, as predicted by Mr. Carruthers, probably show a very serious loss, which might extend over several years. He did not think the Council should speculate with the ratepayers' money. Mr. Gee said he should not vote on the motion, though he entirely agreed with Mr. Holland. Mr. Sworder also opposed the motion on the ground that the Council had no figures before them to show that the electric lighting scheme could be made to pay. The Vice-Chairman (Mr. H. Kent), in a humorous speech, dealt with the remarks of the preceding speakers, and concluded by expressing the opinion that if the resolution was carried, as he had no doubt it would be, a Committee should be formed for the purpose of seeing the Engineers, going into details

thoroughly, and ascertaining what could be done to show the Council were at work. Mr. Pryer, while giving Mr. Carruthers credit for the able way in which he had brought the subject forward, said it was clear to him that the scheme would be a burden for some years. Mr. Fowler, on the other hand, thought that, though it might not pay at the outset, it would eventually be a great help to the town. The Chairman, in closing the discussion, said the question was whether or not the electric light could be made to pay in Bishop's Stortford; and the speech of the mover of the resolution was singularly devoid of any argument which would lead the Council to believe that it would. Nothing that had been said had convinced him that electric lighting was going to be a paying concern for a good many years; and on this ground alone he should vote against the motion. He should be glad to see the electric light introduced by a company, but not an installation by the Council. Mr. Carruthers, in reply, acknowledged that there might be a loss on the first year, but expressed the belief that in the second they would be able to meet all demands and show a profit. The motion was then put and carried by seven votes to four. The installation scheme was consequently adopted.

ELECTRIC LIGHTING IN MARYLEBONE.

London County Council with "Great Reluctance" Sanction a Loan.

At the Meeting of the London County Council last Tuesday, the Finance Committee presented the following report on an application made by the Marylebone Borough Council for sanction to the borrowing of £24,000, repayable on the annuity system in 25 years, for providing and laying electricity mains in about 24 miles of streets in which it is proposed to supply current to 1385 street-lamps.

The Borough Council, in applying for sanction, intimated that it proposed that certain of the work should be carried out by the unemployed, and that if the work were carried out in the ordinary way the cost would be £20,900 instead of £24,000. We are advised that the amount of £20,900 is reasonable; and, in accordance with the Council's practice, the sanction, if given, should be limited to this amount.

The Borough Council state that the laying of the proposed mains will, in addition to providing current for street lighting, enable them to supply private consumers in a large district where they believe there will be an increasing demand for electricity; and, further, that unless the work is carried out they will not be able to fulfil their statutory obligations to supply. The Council are also of opinion that the proposed work will result in improved lighting in the streets in question, and are satisfied that the electricity undertaking will considerably benefit, and that the substitution of electricity for gas in the street-lamps will not involve any additional charge on the general rates for lighting.

We are advised that the streets concerned appear to be sufficiently lighted by the present gas-lamps; and we are of opinion that the scheme is of a somewhat speculative nature, inasmuch as, apart from the receipts from street lighting, the revenue the electricity undertaking will derive from this large extension of mains is not likely to yield a substantial sum, and that it is inadvisable that, in the present position of the undertaking, the Borough Council should incur so heavy a capital outlay, having regard to the fact that the supply of current to these street-lamps will decrease *pro tanto* the ability of the undertaking to meet further demands for remunerative private supply, and so hasten the time when further capital expenditure on electricity generating plant will have to be incurred.

The Borough Council consider it desirable, in the interest of the borough and of the electricity undertaking, that the scheme should be carried out; and as we are unable to say, from the information placed before us, that the electric lighting of the streets will involve any additional charge on the rates, or will prove to be unremunerative so far as the electricity undertaking is concerned, we suggest, though with great reluctance, that the application should be granted.

LIABILITY FOR DEFECTIVE MAINS.

The Metropolitan Water Board and Compensation.

At the Meeting of the Metropolitan Water Board last Friday, the report from the Law and Parliamentary Committee on the subject of compensation claims in respect of burst mains, some extracts from which were given in the "JOURNAL" for the 1st ult. (p. 313), was considered at some length by the Board sitting in committee. The Committee referred to pointed out that the Board were not liable for any damage which might arise from a burst main, unless the person aggrieved could prove that they had been guilty of negligence. It had been the practice of the Works and Stores Committee to direct the Engineer, without admitting liability, to settle a large number of these compensation claims by *ex gratiâ* payments, and without consideration of the question of the Board's negligence. The Law and Parliamentary Committee thought that, in order to secure uniformity of decision, these claims should be dealt with by them. The Board passed the following resolution: "That the Board affirms the principle on which claims and appeals for compensation in respect of damage caused by the bursting of their mains have been dealt with hitherto, and approves of their being dealt with on the respective merits of each particular case on an equitable basis, but without prejudice to the Board's right to deny legal liability, and refers it to a Special Committee to settle all claims, subject to a report to the Board; and that the Special Committee consist of the Chairman and Vice-Chairman of the Board, the Chairman and Vice-Chairman of the Works and Stores Committee, and the Chairman and Vice-Chairman of the Law and Parliamentary Committee."

Reduction in Price at Tunbridge Wells.—The Tunbridge Wells Gas Company announce a reduction of 1d. per 1000 cubic feet in the price of gas, as from the commencement of the present quarter. This makes the charge to consumers in the borough 2s. 7d. per 1000 cubic feet.

STAND-BY WATER SUPPLY FOR AN ASYLUM.

Operation of the Metropolitan Board's Charges Act.

At the Meeting of the London County Council last Tuesday, the Asylums Committee presented a long report on the subject of negotiations which have been going on between them and the Metropolitan Water Board with the view of a stand-by supply of water being obtained for use in Bexley Asylum in case of emergency, such as the outbreak of fire or the temporary failure of the supply from the Asylum well. The whole of the requirements of the building have hitherto, for some ten years, been satisfied from the well; but the Committee have decided that an auxiliary source of water is necessary. At first the Board claimed to have the right, under their Charges Act of 1907, to charge on the rateable value of the Asylum. The annual cost on this basis would come to about £770; but as no water would be used except in case of emergency, the Asylum Sub-Committee did not feel justified in paying this amount. After some negotiation, the Board submitted the following proposal: "To afford a sealed stand-by combined supply for domestic and non-domestic purposes, to be used only in the emergency of the temporary failure or insufficiency of the independent private supply. (*a*) When the seal is unbroken, a minimum quarterly sum of 5-16ths per cent. of the rateable value of the premises, *plus* meter-rent; and (*b*) when the seal is broken, at the rate of 5 per cent. per annum on the rateable value for the time the seal is broken, *plus* meter-rent. Water can be taken, by measure, to the value of the rental paid, and any excess must be paid for by measure. The present assessment of the Asylum is about £15,350; so that the foregoing proposal would involve a minimum quarterly payment of (say) £48—*i.e.*, £192 a year; or, if water were used during any quarter, at the rate of about £192 a quarter for the remainder of that quarter after the date of breaking the seal." The Committee, after careful consideration of all the circumstances, recommended the Council to accept this offer. The agreement under which the building was originally supplied was entered into with the Kent Water Company, and was taken over by the Board. It was terminated on the 31st of January last; and the Committee gave instructions for the preparation of a new one on the basis stated above.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

At a meeting of the Falkirk Town Council on Monday, the Gas-Works Committee reported that the workmen in the gas-works had made the following demands: Holidays, seven days in each year, with pay; wages, benchmen and boilermen, 6d. extra per shift; labourers, 6d. per hour; time-and-a-quarter for overtime, time-and-a-half for Sunday. The Committee were of opinion that the wages and conditions of the shift men compared favourably with those which obtained in the other works, and that therefore they could not recommend the Town Council to agree to the men's demands. As regarded the other employees, the Committee instructed the Manager to get further information from other gas-works, and to report to them at their next meeting. With regard to holidays, the Committee recommended that the shiftmen get one day, with pay, for every two months' service on shift work. Bailie Bogle, the Convener of the Committee, speaking in the Council, said he had received a letter from the Gas Manager, which had been sent to him by a number of the employees, the fitters stating that no one had been empowered to speak for them, and that they were perfectly well satisfied with present conditions. Mr. Muirhead moved that the Committee meet a deputation from the Gas Workers' Union and their officials to put the men's grievances before them. The amendment was not seconded, and the minutes were adopted. This is the first-fruit of a movement on the part of the Gas Workers and General Labourers' Union to organize the workers in the Falkirk district.

During the week, a further four of the series of lectures upon air purification, arranged for by the Glasgow Corporation Gas Committee, were delivered. Mr. James M'Ghee, the Superintendent of the Works Department of the Gas Department, spoke on Tuesday evening, in the Mechanics' Hall in Canning Street, on "Coal Gas and How to Obtain the Best Value from it;" Mr. W. M. Mason, of the Gas Office, on Wednesday evening, spoke in Parkhead Hall upon "Modern Necessities: Gas for Light and Heat;" Mr. M'Ghee again lectured on Thursday evening, in Maryhill Hall; and Mr. S. B. Langlands also lectured for the second time, in the Assembly Rooms in Brown Street, on Friday evening.

A special meeting of the Corporation of Greenock was held on Tuesday, at which, among other matters, a proposed extension at the gas-works was considered. Mr. MacCulloch reported that, at a meeting of the Provosts' Committee that day, the question of the extensions at the Inchgreen Gas-Works was under consideration, and that it had been unanimously agreed that a Sub-Committee named should visit the gas-works and report. Provost M'Millan, in moving the adoption of the minute, said that the Provosts' Committee had to deal with the finances of the various departments, and in this matter they were only following the usual course. Bailie Taylor, the Convener of the Gas Committee, in seconding, said that the decision had been arrived at after very full consideration; and by taking this step, rather than rushing the thing through, no objection could be raised afterwards, if it were resolved to proceed with the work. The minute was unanimously adopted.

A public meeting of the inhabitants of Ferryden was recently held, to consider a proposal to light the locality which has been made by the Montrose Gaslight Company. Two of the Directors of the Company and the Manager—Mr. A. Mackay—attended the meeting. The public lighting, it was explained, would cost from £16 to £20 a year, and, to commence with, would probably entail a rate of 3d. in the pound. The Directors were thanked for their attendance; and a Committee was appointed to ascertain the views of the householders upon the subject, and to report to a future meeting of householders.

The annual reunion of Peterhead Corporation gas-works employees was held on Thursday evening. Bailie Birnie, the Convener of the

Gas Committee, presided. In the course of his remarks, he said that the increase in the gas manufactured during the current year had been well maintained. The yearly expansion in business had been most remarkable—due largely to gas cookers and fires—and showed how readily a community took advantage of a really useful innovation. Like everything else, the gas-works had been subjected to endless criticism; but they had benefited by it very much. A municipal election would be hardly worth having without the gas-works critic. At the same time, many overlooked the fact that the institution was their own property, and was being conducted wholly for their own benefit. The profit was returned to the community in some way. It could not always follow that surplus revenue meant a consequent reduction in the price of gas. The gas-works paid to the municipal and poor rates the large sum of £634, which, to this extent, saved the pockets of the other ratepayers. Of their employees, he said that everyone seemed to fit his own particular department, making a harmonious whole which was doing good work for the community. He wished to refer more particularly to the services of their Manager—Mr. W. Ritchie—whose one aim was the advancement of the works. Few were gifted with the administrative abilities of Mr. Ritchie; and he felt compelled to give a well-deserved meed of praise to their able and painstaking servant. The entertainment—a tea, concert, and dance—was very successful.

A colliery company having offered to the Town Council to light the dock at Dysart with electricity, at a cost of £26 per annum, the Dysart Gaslight Company have come forward with a competitive scheme, in which they offer to erect lamps with four incandescent gas-burners in each. Two of these would be kept always going at night, and when shipping work was being done, the whole four would be lighted. A lively discussion is expected in the Town Council over the rival schemes.

The Aberdeen Corporation Gas Committee on Wednesday had before them an application by Messrs. John Milne and Co., of Dyce, for a supply of gas to their works; and it was agreed to give a supply, provided a guarantee for three years was given that the quantity of gas consumed in each year would equal 20 per cent. of the cost of the work, which is estimated at £70.

Mr. Chrystal, it is stated, surprised some of his colleagues in the Perth Town Council recently, when he submitted for their consideration some figures showing the cost to the rates of the public lighting in the city, as compared with other towns. Public lighting in Perth, he stated, cost £4310, which was equal to 5½d. in the pound. Compared with other towns, this was, he considered, enormously high; the rate in Dundee being only 2·37d., in Glasgow 2·27d., in Paisley 2·32d., in Aberdeen 3·36d., and in Edinburgh 3·29d.

Mr. S. Perks, the Chairman of the Gas Committee, has informed the Rhyl Urban District Council that, as from this month, all Sunday labour at the gas-works would cease until August. This satisfactory position has been rendered attainable by improved plant which has recently been installed in the works.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 26.

Sulphate of Ammonia.

There has been a very firm tone in the market all the week till towards the close, when prices receded 1s. 3d. per ton from the highest point reached. For the first three or four days, the demand continued quite keen, though naturally last week's pace could not be maintained; but February requirements having been covered, there is no longer the same eagerness to purchase. The quotations now are £12 per ton f.o.b. Hull, £12 1s. 3d. per ton f.o.b. Liverpool, and £12 3s. 9d. per ton f.o.b. Leith. It is reported that business has been done at £11 15s. per ton f.o.b. Leith for July-December delivery; but buyers for the most part are not tempted to operate at this figure.

Nitrate of Soda.

This article is rather slow of sale, but values remain unchanged at 9s. 3d. per cwt. for ordinary, and 9s. 6d. for refined quality, on spot.

LONDON, *Feb.* 28.

Tar Products.

The markets for tar products have been steady throughout the past week, though there has been no increase in price. In Belgium, there is a difficulty to do business; while the majority of South Wales manufacturers decline to purchase until they have placed their fuel orders. More business has, however, been done in the Bay ports of France and in the North of France at fairly good figures. Creosote remains unchanged. London manufacturers are fairly firm in their ideas of price. The Midlands are decidedly well sold; and in the North, oil is still selling at reasonable figures. Benzol is steady, and business is reported to have been done on the east coast at 7d., delivery to the end of the year. Fifty-ninety per cent. benzol is firm; and toluol is in good demand. Solvent naphtha is decidedly scarce, and in London especially so. Carbolic acid is quiet. Continental consumers are still offering 1s. per gallon for 60's. Crystals are dull, and liquid carbolic is firm. In anthracene, there is little doing. Tar is improving in value.

The average values during the week were: Tar, 15s. 9d. to 19s. 9d. *ex* works. Pitch, London, 31s. 6d.; east coast, 31s. to 31s. 6d.; west coast, 30s. to 31s. f.a.s. Mersey ports, 30s. to 31s. f.o.b. others. Benzol, 90 per cent., casks included, London, 7¼d.; North, 7d.; 50-90 per cent., casks included, London and North, 7⅞d. to 8d. Toluol, casks included, London, 10d.; North, 9½d. Crude naphtha, in bulk, London, 4d. to 4¼d.; North, 4d. to 4⅛d.; solvent naphtha, casks included, London, 1s. 2½d. to 1s. 3⅜d.; North, 1s. 1½d. to 1s. 2½d.; heavy naphtha, casks included, London, 11½d. to 1s.; North, 10⅝d. to 11½d. Creosote, in bulk, London, 2⅜d. to 2½d.; North, 2½d. to 2⅝d. Heavy oils, in bulk, 2⅝d. Carbolic acid, 60 per cent., east and west coasts, 1s. 0¼d. Refined naphthalene, £4 10s. to £8 10s.; salts, 45s.,

The "EUREKA"

is the outcome of nearly 50 years' experience and continuous perfecting by the Oldest and Largest Gas-Stove Manufacturers in the World.

The "EUREKA" has had more time—more study—more skill expended on it than any Gas Cooker on the market.

JOHN WRIGHT & CO.,
Essex Works,
BIRMINGHAM.

230.

bags included. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market is firm, and very good prices are being paid for next month's delivery. To-day the principal Gas Companies quote £11 15s. to £11 17s. 6d.; and ordinary makes upon Beckton terms are £11 17s. 6d. In Hull, the quotation is £11 17s. 6d. to £11 18s. 9d.; and in Liverpool, £11 17s. 6d. to £12 is asked. In Leith, £12 to £12 2s. 6d. is quoted; and in Middlesbrough, £12.

COAL TRADE REPORTS.

Northern Coal Trade.

There is now a fuller demand for coal with the better supply that is obtainable; and thus the prices do not show much change. In steam coals, best Northumbrians are from 10s. 6d. to 10s. 9d. per ton f.o.b.; for second-class steams, the quotation is from 10s.; and for steam smalls, from 5s. 6d. to 6s. 6d. The production is good for the season. There are still, however, one or two steam coal collieries idle, thus lessening the output, though the absence of the demand from navigations that are closed renders that idleness of small moment. In the gas coal trade, there is a steady demand, though it is less than it was, and is now fairly well met. Durham gas coals vary from 10s. 3d. to 11s. per ton f.o.b., according to quality, for the usual sorts; while for "Wear specials," the quotation is about 11s. 6d. to 11s. 9d., there being still a little scarcity in this class. A few small contracts for gas coal have been entered into. The Rotterdam contract is also in the market; but this is expected to go again to Germany. The feature in the gas coal trade is the demand to replace stocks at gas-works, both home and foreign, which were depleted to some extent in the early weeks of the year, when deliveries for Durham almost ceased. Coke is firm; and good gas coke is about 14s. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

Trade remains unchanged. Outputs are moving off fairly well. Shipping trade is not so brisk; and prices for foreign delivery are, if anything, easier. Small sorts find a ready market. The prices now quoted are: Ell, 9s. 9d. to 10s. per ton f.o.b. Glasgow; splint, 10s. 9d. to 11s.; and steam, 9s. 6d. to 9s. 9d. The shipments for the week amounted to 274,743 tons—a decrease of 34,632 tons upon the preceding week, and of 38,183 tons upon the corresponding week of last year. For the year to date, the total shipments have been 1,906,733 tons—an increase of 352,631 tons upon the corresponding period.

Cheaper Gas for Maldon.—At the annual meeting of the Maldon Gas Company, it was stated that the past year's working had been so satisfactory that the Directors had decided, notwithstanding the prospect of a rise in the cost of coal, to reduce the price of gas from July next to 3s. 6d. net per 1000 cubic feet to ordinary consumers.

Competitive Installations of Gas and Electric Lighting.

The Works Committee of the Westminster City Council lately considered a letter received from the Westminster Electric Supply Corporation, Limited, stating that they had noticed that the Council had arranged to put in an experimental installation of improved lighting in Victoria Street, presumably with gas, and asking to be allowed to put up a similar installation of the electric light. It will consist of twelve metallic filament lamps erected at the west end of the street, and four flame arc lamps at the east end. In view of the fact that the contracts with the Gas Company for low-pressure gas lighting terminate on the 31st of the present month, the Committee accepted the offer, subject to the Corporation bearing the whole cost. The Committee also considered a proposal from the St. James's and Pall Mall Electric Light Company, Limited, to erect an experimental installation of flame arc lamps in Sackville Street, Piccadilly, which is now lighted by incandescent gas-lamps, provided the Council would bear one-half the cost. The Committee agreed to the Company's proposal, subject to their bearing the whole cost of the installation. Should it be proposed to displace any gas-lamps, the Committee's acceptance in each case is subject to the Council having power, under their contracts with the Gas Company, to put gas-lamps out of use.

The New Gasholder Tank at Manchester.—The large gasholder tank at the Bradford Road works of the Manchester Corporation having been completed, it has been tested with water to its full height, and found to be absolutely tight. After the tank has been emptied, the work for the construction of the holder will be commenced. The new tank is 285 feet internal diameter, and 46 ft. 6 in. deep to the bottom of the footings; and it is to receive a four-lift gasholder of a total capacity of 10,410,000 cubic feet.

An Unjust Restriction at Manchester.—The Gas Committee of the Manchester Corporation have entered a protest against the action of the Electricity Department officials in demanding from occupants of new property in the Chorlton-cum-Hardy district an agreement that, in the event of cables being laid, they will not use any other illuminant than electricity. The matter is likely to be brought before the notice of the City Council; the Gas Committee holding that it is an unjust restriction for the Electricity Department to impose.

A Cumberland Water Scheme.—After long deliberation, the Wigton Rural District Council have settled upon a scheme whereby the villages of Brough Hill, Bolton-Low-Houses, Bolton-New-Houses, and several intermediate hamlets, will be provided with water from the supply of the Aspatria, Silloth, and District Joint Water Board, whose trunk main line will be tapped at Mealsgate. This scheme, though estimated to cost slightly more, was accepted in preference to another proposal to obtain a supply from the Wigton Urban District Council's main, which runs close by some of the rural localities that need water.

"A. B. C."

Maintenance!

The attitude of progressive Gas Undertakings in hiring out SOLELY our "A.B.C." Gas Fires is forcible proof of the value of Interchangeability of Parts. In this series, cost of maintenance is reduced to an absolute minimum: **one set of parts** only is necessary for any size of "A.B.C." Fires; and, what is equally important, the HIGH EFFICIENCY of these fires has won GOLDEN OPINIONS.

The Richmond Gas Stove and Meter Co, Ltd.

15 Sizes — 5 Designs.

Advertisement of the RICHMOND GAS STOVE & METER CO., LTD.
London Offices and Show-Rooms: 132, Queen Victoria Street, E.C. General Offices and Works: Warrington.

Falsifying Contractors' Time-Sheets.

At the City Court, Town Hall, Leeds, last Tuesday, W. Bindley, a foreman in the employ of Messrs. Clayton, Son, and Co., Limited, was charged with falsifying the time-sheets and endeavouring to defraud the Company. From the evidence of Mr. Baines, the Secretary of the Company, it appeared that Bindley was foreman erector on a contract which Messrs. Clayton had at Sutton-in-Ashfield; and it was part of his duty to send in to the Company weekly time-sheets to enable them to pay the wages of the persons employed on the contract. In sending in the sheets for the week ending the 10th ult., he made an entry in the name of A. Lane for £1 5s. On this being checked, it turned out that no person of this name had been employed on the contract during that week. Bindley was taxed with the matter, and admitted that the entry had been falsely made. On being charged, he pleaded guilty, and made an explanation that he had paid several small items out of his own pocket during the contract. It was pointed out by the Solicitor for the prosecution (Mr. P. D. Thomas) that this was no excuse, as it was prisoner's duty to acquaint the Company weekly of his out-of-pocket payments, when he would be recouped, and that the rules endorsed on the back of the time-sheets strictly required that this should be done. Mr. Thomas stated that the prosecutors felt compelled, in their own interests and for the benefit of contractors generally, to bring up the prisoner; and seeing that publicity would be given to the case, they would be satisfied if the accused were dealt with under the First Offenders' Act. The Bench adopted this suggestion, and bound the prisoner over in the sum of £5 to come up for judgment if called upon; informing him that he had every reason to be thankful for the attitude the prosecutors had taken up in the matter.

Barnet District Gas and Water Company.—At the half-yearly general meeting of this Company yesterday, the accounts presented showed a balance standing to the credit of the profit and loss account of £28,088, out of which the Directors recommended the declaration of a dividend, less income-tax, at the rate of 7½ per cent. per annum on the "A" and "C" stocks, 6¾ per cent. per annum on the "B" stock, and 5¼ per cent. per annum on the "D" gas and water stocks.

Gloucester and the Standard Burner Bill.—The Town Clerk reported at a meeting of the Gloucester City Council last Wednesday that, as the result of a conference between members of the Council and the Directors of the Gas Company, he had received a letter from the Secretary of the Gas Company stating that, having regard to what had been said, and the friendly relations which had hitherto existed between the two bodies, the Directors had decided to withdraw from the Gas Companies Standard Burner Bill. The Streets Committee expressed their satisfaction at the matter being so arranged; and Mr. Estcourt congratulated the Council on the very satisfactory result of the conference. The Council had intimated before the conference that opposition would be offered to the Bill.

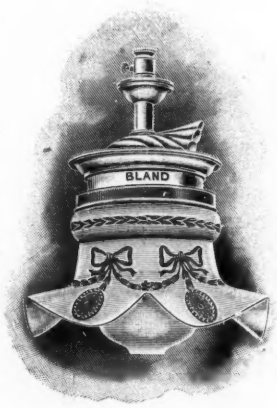
Prospective Rise in Rates in Leeds.—Speaking at the annual dinner of the Leeds and District Chamber of Trades, Alderman Wilson said he thought they would all admit that the rates must go up. It was not a pleasant announcement; but he believed it was a true one. He knew of an extra 2d. which would have to be put upon the rates; and, so far, he did not know of a single farthing in the way of extra revenue. All the estimates, it seemed, were calling for considerable increases; and they could have neither cheaper gas nor cheaper electricity. As a matter of fact, they were not getting from either gas or electricity profits in relief of the rates in proportion to the heavy capital expenditure the undertakings entailed. They "cut their cloth" too finely; they wanted more profits, rather than less. The Chamber must be very contented indeed if the prices were not put up.

Paignton Water Supply.—A report on the water-works, by Mr. C. J. Hawkins, was submitted to the Paignton District Council last week. With regard to the question of distribution, it stated that the method of supplying Paignton, Brixham, Teignmouth, and Ipplepen seemed to be satisfactory to all parties as regarded proportion; but in reference to quantity, probably both Teignmouth and Brixham would like more. As the spring water was very hard, it had been found desirable to discharge a quantity of the water from Holne Moor into the filtered-water reservoirs, to reduce the hardness. The average daily quantity supplied to Paignton from these works was about 240,000 gallons, of which nearly one-third was Holne Moor water. From the consumers' point of view, the distribution of the water seemed to be fairly satisfactory; but a stricter supervision of fittings, house-to-house inspection, and other detail work, must be done before a satisfactory state of things could exist.

Penistone Gas Purchase Question.—The proposal of the Penistone Urban District Council to seek parliamentary authority to purchase the works of the local Gas Company is not regarded with unmixed feelings by the ratepayers. A special meeting of the Council was held on Monday of last week, when the matter was discussed at great length; a number of ratepayers being present to watch the proceedings. Messrs. Cammell, Laird, and Co., proprietors of the Yorkshire Steel and Iron Works at Penistone, wrote stating that if a Bill were brought forward to empower the Council to purchase the gas undertaking, they would oppose it; and the Great Central Railway Company gave a similar notification. A resolution passed at a meeting of the Penistone and District Ratepayers' Association was also read condemning the proposed purchase; and there was a petition signed by 317 persons who strongly opposed the purchase until the ratepayers had been asked to decide the question. Mr. F. Crawshaw, the Chairman of the Gas Committee, moved a resolution that the Council make application in the next session of Parliament for an Act enabling them to purchase the gas undertaking, and empowering them to manufacture and supply gas. After two amendments had been rejected, a resolution was carried adjourning the meeting. In the meantime, a meeting of ratepayers is to be held; and this will be attended by Mr. Newbigging, of Manchester, who advised the Council on the matter.

BLAND BURNERS

FIXED ALL OVER THE TOWN.



A Gas Manager writes:

The "Bland" Burners I have fixed are giving the Consumers the greatest satisfaction, and I shall have little trouble in fixing them all over my town.

THE BLAND LIGHT SYNDICATE, LIMITED, LONDON and MANCHESTER.

The Finance Committee of the Cardiff Corporation have decided to expedite the work of converting the whole of the flat-flame gas-burners in the city into incandescent lights, so that it may be completed by next winter. The change, where it has already been effected, has been welcomed by the ratepayers.

The London Vertical Retort Syndicate, Limited, has been registered with a capital of £2000, in £10 shares, to acquire from Messrs. T. M. Thom and H. Pryor the benefit of certain inventions relating to improvements in the manufacture of lime and carbonic acid gas, and in retort-furnaces for the manufacture of gas.

By an explosion in a trench at the new water-works which the Bolton Corporation are carrying out at Egerton, William M'Laughlin and Daniel M'Kay were seriously injured, and had to be taken to the Bolton Infirmary, where the former succumbed to his injuries. Another man was slightly injured. All the men belonged to Glasgow; the Contractors for the work being Messrs. Best and Son, of that city. It is surmised that an unfired cartridge was among the rock blown out; and when the men commenced to remove the rock and other *débris*, M'Laughlin must have struck the cartridge with his pick.

We have received from Messrs. Clapham Bros., of Keighley, a neat section of Clapham's patent "Eclipse" special rubber joint, arranged for use as a paper-weight, and also intended as a reminder "of what is acknowledged to be the best and most secure form of jointing yet introduced for the covers of luteless purifiers (Green's type)." An accompanying circular-letter explains that the rubber is a mixture, manufactured for the firm only, to withstand the action of the various crude gases. The patent steel clip ensures a permanent joint between the rubber and covers, and affords a lateral support to the rubber, and allows it to move freely when the pressure is applied. Messrs. Clapham Bros. have already sold 30,600 feet of the joint; and 15,000 rapid automatic fasteners have been supplied.

The annual *soirée* in connection with the Sick and Benevolent Society of the Burslem Corporation Gas-Works took place last Thursday, and was largely attended. About 150 sat down to tea; and the subsequent proceedings were presided over by the Chairman of the Gas Committee (Mr. T. Mitchell). Mr. P. G. Boult (Secretary of the Society) presented the annual report, which showed the sum of £90 as contributions towards the sick fund, and £48 paid as sick benefit. The amount available for dividend was £38. The benevolent fund showed £4 as income; and to the hospital fund the contributions came to £8 4s. Mr. Edward Jones, the Corporation Gas Engineer, who is the President of the Society, stated that during the time it had been in existence they had been able to disburse £300 from the sick fund. The benevolent fund was a pet scheme of his own; and he was proud of the good it had accomplished by sending men to the seaside to recuperate. During the evening a programme consisting of songs and recitations was gone through, and every provision made for the enjoyment of the guests.

The annual dinner provided by the Directors of the Shanklin Gas Company for the office staff and workmen took place in the Board-room a few days ago, and was largely attended. The Engineer and Secretary (Mr. F. C. Taylor) presided; and the Chairman and Deputy-Chairman (Messrs. F. Cooper and R. Young) were present. The toasts of "Success to the Company," "The Chairman and Directors," and "Mr. and Mrs. Taylor and Family," were cordially honoured; special thanks being accorded to Mr. and Mrs. Taylor for their work in the arrangements for the dinner. An extensive programme of music was carried out; and a very pleasant evening was spent.

A large gathering of the members of the Burton Branch (No. 1) of the Amalgamated Society of Gas Workers, Brickmakers, and General Labourers took place last Wednesday, on the occasion of the annual dinner and social evening. In the absence of Alderman T. E. Lowe, the Chairman of the Gas Committee, Alderman J. S. Rowland presided, and was supported by Mr. H. George (President of the Association), Mr. R. S. Ramsden (Assistant Gas Manager), Mr. H. Simpson (General Secretary of the Association, and Mr. W. Goodhead (Secretary of the Burton Branch. The Chairman proposed "The Gas Workers," and recommended everyone to join the Society; remarking that the new way of dealing with difficulties was infinitely better than by the obsolete and ugly method of strikes. Mr. George responded. Mr. Hickinbottom proposed "The Management of the Burton Corporation Gas-Works," and spoke of the satisfactory relations subsisting between the men and the Manager, who, he said, did his best to remove difficulties, and did his duty to ratepayers and employees alike. Mr. Ramsden returned thanks, and assured the company that as long as he had the management of the gas-works he would be always willing to meet amicably level-headed men.

The claim made by the Sunderland Corporation against Messrs. Laing and Sons, a local shipbuilding concern, which went into voluntary liquidation with a view to reconstruction, has been unsuccessful. The Corporation sought to be admitted as creditors; but the Liquidator rejected their proof—a decision which, on appeal, has been upheld by Mr. Justice Neville. The Council's contention was that prior to June, 1907, an agreement, incorporated in certain letters, was entered into between the parties, by which the Company were to take a supply of electricity from the Council for fifteen years. Under the agreement, the Company were to pay a minimum rate of £1500; this being really in the nature of payment for plant which the Council had erected at a cost of £21,000. A claim by the Council for £4955 for electricity actually supplied had been admitted; but the Council held that they were entitled to the further sum for breach of contract. There was no agreement under seal; but it was contended that a part performance by the Company of the agreement was sufficient to waive this objection. The Council received notice from the Company that they were going to suspend payment. They then demanded security, which the Company did not find; and the Council cut off the supply. For the Company, it was submitted that there was no contract; and even if there were, the breach was by the Council in cutting off the supply.

What about the Hot Water?

Shall your Consumers still be dependent on the Coal Fire?

MAUGHAN GEYSERS

Will give a Hot Bath in a **few minutes** at a cost of **3d./4**

The "GACYLOTE" Cylinder

Will supply the whole House, with great economy.

The "HOLBORN" Circulator

Can be attached to existing Pipes.

May we send you our suggestions for supplying these to your Consumers on lines successfully adapted by other Gas Undertakings.

STOUR STREET, SPRING HILL,
BIRMINGHAM.

129, HIGH HOLBORN,
LONDON.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations, &c., Vacant.

GAS ENGINEER AND MANAGER. Congleton Gas Department. Applications by March 10.
MANAGER. No. 5198.
MANAGING FOREMAN (METER TRADE). No. 5193.

Situations Wanted.

ASSISTANT, &c. No. 5 97.
ASSISTANT-MANAGER OR HEAD FOREMAN (COKE-OVENS). No. 5187.
SECRETARY, MANAGER, OR ACCOUNTANT. No. 5115.

Capital Wanted. No. 5196.

Old "Journals" Wanted. No. 5183.

Plant, &c. (Second Hand), for Disposal.

AIR GAS PLANT. No 5195.
EXHAUSTERS AND STEAM ENGINES. Smethwick Gas Department.
SATURATOR. No. 5194.

Plant (Second-Hand) Wanted.

CAST-IRON TANK. British Coalite Company. Tenders by March 4.
TOWER SCRUBBER. No. 5190.

Business for Disposal.

ANTI-VIBRATION INCANDESCENT LIGHTING COMPANY.

Stocks and Shares.

BOURNEMOUTH GAS AND WATER COMPANY. March 17.
GASLIGHT AND COKE COMPANY. March 15.
HORNSEY GAS COMPANY. March 22.
MITCHAM AND WIMBLEDON GAS COMPANY. March 15.
ROMFORD GAS AND COKE COMPANY. March 15.
SEVENOAKS WATER COMPANY. March 15.
SOUTH AFRICAN LIGHTING ASSOCIATION. No. 5199.
WANDSWORTH AND PUTNEY GAS COMPANY. March 15.

TENDERS FOR

Benzol.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.

Coke.
LEIGH-ON-SEA GAS DEPARTMENT.

Cookers.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.

Fire-Clay Goods, &c.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.
STOCKPORT GAS DEPARTMENT. Tenders by March 15.

General Stores—
(Brass and Meter Fittings, Bolts and Nuts, Barrows, Iron and Steel, Ironmongery, Lead and Lead Pipe, Oils, Tallow, Paints, Tools, Drysaltery, Lime, Brushes, Taps, Glass, &c., &c.)
DARLINGTON GAS DEPARTMENT. Tenders by March 16.
HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD. Tenders by March 5.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.
STOCKPORT GAS DEPARTMENT. Tenders by March 15.

Incandescent Goods, Lamps, &c.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.

Meters.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.
STOCKPORT GAS DEPARTMENT. Tenders by March 15.

Pipes, &c.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.
STOCKPORT GAS DEPARTMENT. Tenders by March 15.

Sulphuric Acid.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.
RAMSGATE GAS DEPARTMENT. Tenders by March 8.

Tar and Liquor.
EXETER GASLIGHT COMPANY. Tenders by March 7.
PONTYPRIDD GAS DEPARTMENT. Tenders by March 7.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 562.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,474,700	Stk.	Oct 14	5	Alliance & Dublin Ord.	86–88	..	5 13 8
310,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
200,000	5	Oct. 28	6¼	Bombay, Ltd.	6–6¼	..	5 4 0
40,000	5	,,	6¼	Do. New, £4 paid	4⅜–4¼	..	5 6 8
50,000	10	Feb. 25	15	Bourne-	10 p.c.	..	29–30*	..	5 0 0
311,810	10	,,	7	mouth Gas	B 7 p.c.	..	16½–16⅝*	..	4 3 7
75,000	10	,,	6	and Water	Pref. 6 p.c.	..	15–15⅜*	..	3 17 5
380,000	Stk.	,,	12½	Brentford Consolidated		..	250–253*	..	4 18 10
300,000	,,	,,	9⅜	Do. New		..	187–189*	..	5 0 6
50,000	,,	Aug. 12	5	Do. 5 p.c. Pref.		..	120–122	..	4 2 0
206,250	,,	Dec. 29	4	Do. 4 p.c. Deb.		..	101–103	..	3 17 8
220,000	Stk	Sep. 10	11	Brighton & Hove Orig.		..	218–221	..	4 19 7
246,320	,,	,,	8	Do. A Ord. Stk.		..	154–157	..	5 1 1
460,000	20	Oct. 14	10	British		..	42½–43⅜	..	4 11 11
109,000	Stk.	Feb. 25	6	Bromley, A 5 p.c.		..	116–118*	..	5 1 8
165,700	,,	,,	4½	Do. B 3½ p.c.		..	87–89*	..	5 1 2
82,278	,,	,,	5⅜	Do. C 5 p.c.		..	103–105*	..	5 4 9
55,000	,,	Dec. 29	3½	Do. 3½ p.c. Deb.		..	87–89	..	3 18 8
503,000	10	Oct. 14	7	Buenos Ayres (New) Ltd.		..	14⅜–15½	..	4 11 10
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.		..	98–100	..	4 0 0
100,000	10	—	—	Cape Town & Dis., Ltd.	3–4	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5⅛–5⅜	..	—
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	48–49	..	6 2 6
100,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	80–82	..	5 9 9
157,150	Stk.	Aug. 12	5	Chester 5 p.c. Ord.	108½–110½	..	4 10 6
1,513,280	Stk.	Feb. 25	5⅜	Commercial 4 p.c. Stk.	105–108*	..	4 16 4
560,000	,,	,,	5	Do. 3½ p.c. do.	103–105*	..	4 15 3
475,000	,,	Dec. 29	3	Do. 3 p.c. Deb. Stk.	81–83	..	3 12 3
800 000	Stk.	Dec. 10	5	Continental Union, Ltd.	95–97	..	5 3 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	137–139	..	5 0 9
492,270	Stk.	—	5	Derby Con. Stk.	121–123	..	4 1 4
55,000	,,	—	4	Do. Deb. Stk.	103–105	..	3 16 2
148,995	,,	Oct. 2	5	East Hull 5 p.c. Ord.	98–100	..	5 0 0
486,090	10	Jan. 27	12	European, Ltd.	21½–24⅜	..	4 17 0
354,060	10	,,	12	Do. £7 10s. paid.	18½–18⅞	..	4 16 0
15,141,545	Stk.	Feb. 10	4⅜	Gas	4 p.c. Ord.	..	104½–105½	..	4 8 5
2,600,000	,,	,,	3½	light	3½ p.c. max.	..	87–89	..	3 18 8
3,799,735	,,	,,	4	and	4 p.c. Con. Pref.	..	103–105	..	3 16 2
4,193,975	,,	Dec. 29	3	Coke	3 p.c. Con. Deb.	..	81–83	..	3 12 3
258,740	Stk.	Sep. 10	5	Hastings & St. L. 3½ p.c.		..	95–97	..	3 3 1
82,500	,,	,,	6⅜	Do. do. 5 p.c.		..	119–121	..	5 7 5
70,000	10	Sep. 29	11	Hongkong & China, Ltd.		..	17⅜–18	..	6 2 3
131,070	Stk.	Sep. 10	6⅜	Ilford A and C		..	145–147	..	4 8 5
65,780	,,	,,	5	Do. B		..	108–110	..	4 10 11
65,500	,,	Dec. 29	4	Do. 4 p.c. Deb.		..	100–102	..	3 18 5

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
4,940,000	Stk.	Nov. 11	8	Imperial Continental	175–177	..	4 10 5
1,235,000	Stk.	Feb. 10	3⅜	Do. 3½ p.c. Deb. Red.	92–94	..	3 14 6
195,242	Stk.	Aug. 26	6	Lea Bridge Ord. 5 p.c.	120–122	..	4 18 4
561,000	Stk.	,,	10	Liverpool United A	227–229	..	4 7 4
718,100	,,	,,	7	Do. B	16–16½	..	4 2 10
306,083	,,	Dec. 29	4	Do. Deb. Stk.	103–105	..	3 16 2
75,000	5	Nov. 26	6	Malta & Mediterranean	4⅜–5	..	6 0 0
560,000	100	Oct. 1	5	Met. of	5 p.c. Deb.	..	59–102	..	4 18 0
250,000	100	,,	4½	Melbourne	4½ p.c. Deb.	..	100–102	..	4 8 3
541,920	20	Nov. 11	3⅜	Monte Video, Ltd.		..	12⅜–13½	..	5 5 8
1,775,892	Stk.	July 29	4⅜†	Newc'tle & G'tesh'd Con		107½–108	−½	4 0 8
529,435	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	91–93	..	3 15 3
55,940	10	Feb. 25	7	North Middlesex 7 p.c.	12⅜–13¼*	..	5 5 8
300,000	Stk.	Nov. 26	8	Oriental, Ltd.	138–140	..	5 14 4
60,000	5	Sep. 10	8	Ottoman, Ltd.	6⅛–6⅜	..	6 5 6
31,800	53	Feb. 25	13	Portsea Island A.	134–136*	..	5 1 0
60,000	50	,,	13	Do. B.	126–128*	..	5 1 7
100,000	50	,,	12	Do. C.	119–121*	..	4 19 2
114,800	50	,,	10	Do. D and E.	100–102*	..	4 18 0
398,490	5	Oct. 28	7	Primitiva Ord.	7⅜–7⅝	..	4 8 11
796,980	5	Jan. 27	5	Do. 5 p.c. Pref.	5⅜–5⅝	..	4 8 11
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
1,900,000	10	Oct. 14	8	River Plate Ord.	17¾–18½	+¼	4 7 8
312,650	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	99–101	..	3 19 3
250,000	10	Sep. 29	8	San Paulo, Ltd.	14¾–15½	..	5 4 11
62,500	10	,,	6	Do. 6 p.c. Pref.	11½–12¾	..	4 18 0
125,020	50	Jan. 3	5	Do. 5 p.c. Deb.	50–51	..	4 18 0
135,000	Stk.	Sep. 10	10	Sheffield A	233–235	..	4 5 1
269,984	,,	,,	10	Do. B	233–235	..	4 5 1
523,500	,,	,,	10	Do. C	233–235	..	4 5 1
70,000	10	Oct. 14	10	South African	12½–12⅝	..	7 16 11
6,429,895	Stk.	Feb. 10	5/9/4	South Met., 4 p.c. Ord.	120–122	+1	4 9 7
1,895,445	,,	Jan. 13	3	Do. 3 p.c. Deb.	82–84	..	3 11 4
209,820	Stk.	Aug. 26	8	South Shields Con. Stk.	161–162	..	4 18 9
605,000	Stk.	Feb. 25	5⅜	S'th Suburb'n Ord. 5 p.c.	120–122*	..	4 12 9
60,000	,,	,,	5	Do. 5 p.c. Pref.	119–121*	..	4 2 8
117,058	,,	Jan. 13	5	Do. 5 p.c. Deb. Stk.	121–123	..	4 1 4
502,310	Stk.	Nov. 11	5	Southampton Ord.	110–112	..	4 9 3
120,000	Stk.	Feb. 10	6⅜	Tottenham	A 5 p.c.	..	133–135	..	5 1 9
453,940	,,	,,	5⅜	and	B 3½ p.c.	..	111–113	..	4 15 2
149,470	,,	Dec. 29	4	Edmonton	4 p.c. Deb.	..	98–100	..	4 0 0
182,380	10	Dec. 29	8	Tuscan, Ltd.		..	9⅛–9⅜	..	8 4 2
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	99–101	..	4 19 0
236,476	Stk.	Aug. 14	5	Tynemouth, 5 p c max.	114–116	+1	4 6 2
255,636	Stk.	Feb. 25	6⅜	Wands-	B 3½ p.c.	..	139–141*	..	4 14 0
79,416	,,	Dec. 29	3	worth	3 p.c. Deb. Stk.	..	74–76	..	3 18 11

Prices marked * are "Ex div." † Next dividend will be at this rate.

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The Minimum Subscription on which the Directors may proceed to allotment is 175,000 Shares.

AUTHORIZED CAPITAL - - £300,000

DIVIDED INTO 300,000 SHARES OF £1 EACH - - - £300,000.

Issue of 260,000 Shares of £1 each - - - - £260,000

OF WHICH

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175,000	Shares are now offered for Subscription at £1 each - - - - - - - - - -	£175,000
260,000		£260,000

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SIR JAMES PENDER, BART., Donhead House, Salisbury (Director of the Metropolitan Electric Supply Co., Ltd.).
H. C. B. UNDERDOWN, 9, Gracechurch Street, E.C., Merchant (Director of Direct United States Cable Co., Ltd.).

Solicitors.

For the Company: MESSRS. MACKRELL, MATON, GODLEE & QUINCEY, 21, Cannon Street, London, E.C.

For the Vendors: MESSRS. MACANDREW, WRIGHT & MURRAY, W.S., 9, Albyn Place, Edinburgh.

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This Company is formed for the purpose of acquiring from the Vendors (The Trinidad Petroleum Company, Limited, of 41, Bishopsgate Street Within, London, E.C.) their oil and other mineral rights in and over lands situated in the Guapo and La Brea Districts in the Island of Trinidad, aggregating 3791 acres, made up as under: Crown Lands, 3200 acres; Adventure Estate, 273 acres; La Fortunée Estate, 318 acres; total, 3791 acres.

The Vendors have obtained from the Trinidad Government a lease of the crude oil, bituminous minerals (including asphalt), and natural gas in the Crown Lands before mentioned, for a term of 21 years from the 1st July, 1909, with a right of renewal thereof on the expiration of that period for a further term of 21 years.

The Vendors have further acquired in perpetuity and on favourable terms all the oil and mineral rights in the Adventure Estate, and have also the right to take portions of the surface of the estate, extending to about 60 acres, on lease for a term of 99 years. This secures easy access to the Crown Lands included in the Government lease, and to the sea for the shipment of oil.

The Vendors have also acquired in perpetuity and on favourable terms from the registered proprietors of the La Fortunée Estate (which lies immediately to the west of the Adventure Estate) the oil and other mineral rights in La Fortunée and the freehold of 110 acres of the surface of this estate. A claim has been made against the last-mentioned proprietors to one undivided third share of the La Fortunée Estate (which consists, as above stated, of 318 acres), and this is at present the subject of proceedings in the Trinidad Courts between the claimant and those proprietors. The Company will take the rights in this estate subject to the right of the claimant (if any), but will be entitled to the benefit of all remedies by the Vendors against the said registered proprietors under their covenants for title.

The Vendors have expended considerable sums in ascertaining and proving the existence of oil in paying quantities in the lands above mentioned, and have at the present time three wells which have struck rich sources of oil at depths of 712 feet, 672 feet, and 520 feet respectively. It will not be needful, therefore, for the Company to engage in a speculative search for oil; all that will be necessary for it to do will be to develop the discoveries of oil already made and market the product.

The favourable position which the Trinidad Oilfield occupies relatively to other well-known oilfields will be at once seen when it is stated that no part of the properties to be acquired by this Company is distant more than six miles from the sea, as compared with hundreds of miles which separate the Russian, Roumanian, and most of the American oilfields from their ports of shipment. The result of this advantage of position is that the cost of placing the oil on the seaboard will be extremely low, being estimated at 6d. per ton, as compared with 7s. and upwards ruling on other well-known oilfields.

Extracts from the Reports by Messrs. Thompson and Hunter, and also by Sir Boverton Redwood, are quoted below, and from the latter report it will be seen that the oil found in the Company's wells compares very favourably with that of other oilfields, its calorific value being specially notable.

The price to be paid by the Company to the Vendors is £153,000, payable as to £68,000 in cash, and as to £85,000 in fully paid-up shares of £1 each, the Company undertaking the obligations of the Vendors in respect of the said mineral and other rights and property. The Vendors are also entitled to the call of the 40,000 unissued Shares of the Company for two years from the 15th March, 1910, at a premium of 10s. per Share, which right has been transferred to the Underwriters in accordance with the Agreement hereinafter mentioned. The purchase price includes modern drilling plant, casing, steam engines and boilers, pumps, pipes, stores, and tools, furnished dwellings, storehouses, and a light railway, and the wells already sunk. It also includes the expenditure which has been made by the Vendors in surveying and grading a road leading from the coast into the Crown lands, with bridges, conduits, &c.

The present issue of Shares will provide a sum of about £100,000 for working capital, which the Directors consider ample to bring the Company into a dividend-paying condition.

The demand for oil fuel for marine and railway purposes is rapidly increasing owing to its recognized advantages over coal—especially for war vessels—and in this direction a market which is practically inexhaustible is being opened up. **The advantages to the British Admiralty of being able to obtain a supply of fuel oil from a British Colony** comparatively free from danger of interruption is apparent, and has been recognized by the Admiralty. Consequently, **in terms of the Government Lease before mentioned, the lessees are under agreement to supply oil fuel to the Admiralty**, when they are in a position and requested to do so, on terms which are considered fair in all respects, such oil fuel to be delivered at the Company's shipping place at Guapo. **Contracts for the supply of oil fuel to the Admiralty may therefore be confidently anticipated.**

The consumption of oil fuel on Mexican and South American Railways is very largely increasing, and here again large contracts may be expected.

The Statistical Abstract of the British Colonies states that 550,000 gallons of oil and kerosene are imported annually into Trinidad. The import duty is 9d. per gallon and the nett revenue from the duty about £20,000 per annum.

The neighbouring Island of Barbados imports 400,000 gallons per annum; Jamaica, 821,929 gallons; British Guiana, 705,710 gallons; and Bermuda, 300,000 gallons. The price of fuel at all these places is very high, and owing to the short sea passage it is anticipated that no other country can compete with Trinidad for the local West Indian market.

Messrs. Thompson and Hunter, Consulting Engineers and Petroleum Experts, of 3, Lombard Street, E.C., state that the cost of production should not, in their opinion, exceed 15s. a ton, and may easily fall to 5s. if gas is employed as fuel, and all the wells can be pumped. They estimate that towards the end of the first year 3000 tons a month should be obtained, and towards the end of the second year 6000 tons a month, which at an average profit of only 15s. a ton, would yield £54,000, or sufficient to pay a very substantial dividend on the whole of the Company's share capital.

There is an ample supply of labour in the island.

Messrs. Thompson and Hunter also report as follows:—

"A well-defined anticline has been located running in an approximately East to "West direction inland from the coast near Point Fortin, its course for many "miles across the forest lands being indicated by exudations of semi-liquid pitch "and issues of inflammable gas. On the northern side of the anticline the beds "have a lower dip than on the southern, and nowhere except near the crest of the "anticline do the beds exhibit any inclinations which would render drilling operations difficult. **This anticline runs through the centre of the Vendors' properties.**

"The strata composing the oil-bearing series have a thickness of fully "1,000 feet and consist of alternate beds of clay, sandy clays, occasional "beds of hard sand and oil sands, some of which latter attain a thickness "of 50 feet; many of the oil sands outcropping on the coast are heavily "impregnated with petroleum, although exposed to the action of water at "each tide; and the sea is frequently covered with a film of oil for miles "along the coast line."

Trial wells sunk by the vendors have amply demonstrated the petroliferous character of the Guapo anticline.

A series of boreholes (aggregating in depth upwards of 1200 feet) sunk with hand drill, penetrated oil sands and yielded petroleum, which in the case of four of these wells, rose to the surface and overflowed.

The three deepest wells (sunk by machine drill), after yielding oil at various depths, struck rich sources at 712 feet, 672 feet, and 520 feet respectively.

The most satisfactory advices have been received from the manager in Trinidad since these strikes of oil. He reported that the fountains of oil from the wells rose repeatedly to the height of the derrick (about 70 feet), and that there was continued evidence of strong gas pressure. Later, when temporary storage had been provided, about 100 tons of oil were baled in four days from one of the wells without its showing any sign of decreased yield. The very moderate depth at which oil in large quantities has been struck is a most satisfactory feature. As the storage accommodation at present available is limited in capacity, the wells have hitherto been drawn upon only for the oil required by the vendors for fuel and lighting purposes and to meet local sales.

Samples of the oil obtained from the Company's wells have been submitted to Sir Boverton Redwood, D.Sc., F.R.S., and a copy of his report accompanies the prospectus.

Sir Boverton Redwood's report shows that after the removal by distillation of the petrol and illuminating oils (*i.e.*, the more valuable volatile constituents), the residual oil, amounting to some 60 per cent., is available as a fuel oil of high flash point. He draws attention to the absence of solid hydrocarbons in commercial quantities, and also to the small percentage of sulphur, and to the consequent comparatively small cost of producing a high-class fuel oil. He states that for ordinary requirements any removal of sulphur might be unnecessary. This is of the greatest importance, as it is well known that great difficulty and expense has been encountered by several of the largest oilfields in other parts of the world in producing oil to satisfy the Admiralty's requirements, owing to the presence of solid hydrocarbons and of sulphur in excessive quantities.

A highly satisfactory feature of Sir Boverton Redwood's report is the large proportion of petrol and illuminating oils, ranging from 12½ to 14 per cent. and 25 to 27 per cent. respectively.

Professor P. Carmody, Government Analyst of Trinidad, has also reported favourably on a sample of oil drawn by the Inspector of Mines to the Trinidad Government from one of the Company's wells during sinking at a depth of 400 ft.

Full Prospectuses, upon the terms of which applications will alone be received, and Forms of Application, can be obtained at the Offices of the Company, or from the Solicitors or Brokers.

WANTED, a Manager for 50-Million Works, Experienced in Regenerator Furnaces, Slot-Work, Fittings, Maintenance, &c., and Competent to TAKE ENTIRE CONTROL.

Apply, by letter only, to No. 5198, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS Meter Works—wanted a reliable MANAGING FOREMAN to Take Complete Charge of Shop. Must be Practical, a Good Disciplinarian, and able to work out Prime Costs.

Apply, by letter, giving Salary required, and stating Experience, and Age, to No. 5193, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

"JOURNAL of Gas Lighting" wanted to Purchase back numbers for May 8, May 15, and July 10, 1900, also May 19, 1903.

Address No. 5183, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SCRUBBER.

WANTED by a Gas Company making 13 Millions, a suitable Second-Hand TOWER SCRUBBER. Must be Cheap and in Fair Condition.

Particulars to No. 5190, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the *best*. Satisfaction Guaranteed.

CAST-IRON Pipes. Spigot and Socket or Flanged. Special Quality—9 feet or 12 feet Lengths. When buying, Write us.

A. LOWCOCK, Limited, SHREWSBURY.

GASHOLDERS—Splendid 45 feet diameter and New STEEL TANK, fixed Complete to Plan and Specification; also 14 feet and 16 feet Diameter GASHOLDERS, with STEEL TANKS. Can be seen temporarily erected. Re-erected Cheap for immediate Sale.

FIRTH BLAKELEYS, Thornhill, DEWSBURY.

FOR SALE—One 150-Burner National Air-Gas Company's PLANT. Nearly New and in Good Order. Has been little used. Can be seen in London on Application.

Address No. 5195, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—One Three-Ton Leaden SATURATOR, including all Pipe Connections, open Type. Suitable either for Hand Fishing or for Wilton's Ejector. Strongly built and in good Condition. Has been only little used. Can be inspected.

Address No. 5194, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE ANTI-VIBRATION INCANDESCENT LIGHTING COMPANY, LIMITED.

IN VOLUNTARY LIQUIDATION.

THIS well-known and Established business of Gas Lighting Engineers and Makers of Greenall's Positive Measurement Meter, as at present carried on at the Albion Works, Otley, is now OFFERED AS A GOING CONCERN, with all Plant and Machinery, Patterns, Patents and Goodwill.

The Works were re-arranged Five Years ago, by the Company, and are admirably adapted for their purposes, consisting of a large, very well-lighted shed, with extensive Offices, Storeroom, and Lavatories, with small Iron and Brass Foundries attached, the whole covering an area of 3000 sq. yards, and can be obtained at a moderate rental.

Apply to the LIQUIDATOR, Albion Works, OTLEY.

COUNTY BOROUGH OF SMETHWICK.

(GAS DEPARTMENT.)

SECOND-HAND EXHAUSTERS AND STEAM-ENGINE.

THE Gas Committee of the Corporation of Smethwick have FOR SALE—

Two Donkin EXHAUSTERS, with STEAM-ENGINES COMBINED, including Disc Valves. Nominal capacity, 40,000 and 60,000 Cubic Feet per Hour respectively; also a

HORIZONTAL HIGH-PRESSURE STEAM-ENGINE, 14-inch bore, 20-inch stroke, to work at 80 Steam Pressure.

The plant can be seen at work at the Gas-Works, Rabone Lane, during the next two or three weeks; and any further Particulars can be obtained on Application to Mr. Vincent Hughes, Engineer, at the Gas-Works.

Offers, endorsed "Second-Hand Plant," to be addressed to the Chairman of the Gas Committee, and sent to the undersigned.

W. J. STURGES,
Secretary.

Gas Department, Council House,
Smethwick, Feb. 15, 1910.

THE British Coalite Company, Limited, 3, London Wall Buildings, London, E.C., invite TENDERS for the Supply of a Covered Second-Hand CAST IRON TANK, built in sections, of from 75,000 to 125,000 Gallons Capacity.

Tenders, with detailed Specification, giving Size and Thickness of Plates, Position and Sizes of Manhole, Outlets and Inlets, and to include Free Delivery at the Company's Works, Barking, to be forwarded to the OFFICES OF THE COMPANY, 3, LONDON WALL BUILDINGS, E.C., by Friday, the 4th of March.

URBAN DISTRICT COUNCIL OF LEIGH-ON-SEA.

SALE OF COKE.

THE Gas Committee of the above Council are desirous of Disposing of about 100 Chaldrons of COKE (which Coke they are accumulating at the rate of 30 Chaldrons per week), and are prepared to receive Tenders for that purpose.

Persons tendering must be prepared to take the Coke by Barge from the Gas-Works Wharf, Leigh-on-Sea (f.o.b.).

Tenders should be addressed to me the undersigned, and should be endorsed "Tender for Coke."

W. CARLYLE CROASDELL,
Clerk to the Council.

Council Offices, Leigh-on-Sea.

HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD.

THE above Board are prepared to receive TENDERS for the Supply of SUNDRY STORES, to be delivered in Quantities as the Gas Board may require during the next Twelve Months ending March 31, 1911.

Forms of Tender and any further Particulars may be had on Application to Mr. E. J. Wellens, Engineer and Manager.

Sealed Tenders, endorsed "Sundry Stores," and addressed to James Simpson, Esq., Chairman of the Gas Board, Gas Offices, Hebden Bridge must be delivered by Noon on Saturday, March 5, 1910.

The Committee do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to divide the Quantity as required.

By order of the Gas Board,
R. CRABTREE,
Clerk.

Gas Offices, Carlton Street,
Hebden Bridge, Feb. 24, 1910.

DARLINGTON CORPORATION.

(GAS-WORKS DEPARTMENT.)

TENDERS FOR STORES.

THE Gas Committee invite Tenders for the Supply of the following GENERAL STORES, to be ordered in such Quantities as may be required during the period ending March 31, 1911.

1—Brass and Meter Fittings.
2—Iron and Steel.
3—Ironmongery.
4—Lead Compo. Pipe and Pig Lead.
5—Drysaltery.
6—Lubricating Oils, &c.
7—Oxide Paint, Red and White Lead.
8—Shovels, Coke Forks, &c.
9—Brooms, Brushes, &c.

Further Particulars and Forms of Tender may be obtained on Application to Mr. Frank P. Tarratt, Engineer and Manager, Gas-Works, Darlington.

Sealed Tenders, properly endorsed, must be addressed to the Chairman of the Gas-Works Committee, and sent in not later than Wednesday, the 16th of March, 1910.

No pledge is given that the lowest or any Tender will be accepted.

H. G. STEAVENSON,
Town Clerk.

Darlington, Feb. 25, 1910.

PONTYPRIDD URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE above Council invite Tenders for the Purchase of the Surplus COAL-GAS TAR and WATER-GAS TAR produced at their Treforest Works during the Year ending March 31, 1911.

Tenders to state the Price per Ton, or per 200 Gallons for (*a*) Coal-Gas Tar; (*b*) Water-Gas Tar.

The Tar will be delivered into the Contractor's Railway Tank Waggons at the Treforest Gas-Works Siding, Alexandra Docks and Railway Company's line.

Tenders, sealed and endorsed "Surplus Tar," must be received by the undersigned, on or before Monday, March 7, 1910.

J. COLENSO JONES,
Clerk to the Council.

Municipal Buildings,
Pontypridd, Feb. 19, 1910.

PONTYPRIDD URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE above Council invite Tenders for the Supply of the following STORES and MATERIALS for the year ending March 31, 1911:—

No. 1—Gas Cookers.
No. 2—Sulphuric Acid.
No. 5—Fire-Clay Goods, &c.
No. 5a—Silica Fire-Clay Goods.
No. 6—Wrought Iron Tubes and Fittings.
No. 7—Lead and Compo. Tubing.
No. 8—Barrows, Rake Heads, &c.
No. 9—Oils and Benzol.
No. 10—Brass Fittings and Sundries.
No. 11—Slot Fittings.
No. 12—Meters.
No. 13—Main Taps and Locks.
No. 15—Cast-Iron Mains and Specials.
No. 16—Incandescent Materials.
No. 18—Lamps and Copper.
No. 19—Horse Feed.

Forms of Tender and Specification may be obtained, on Application, from Mr. E. H. Swain, Engineer, Gas-Works, Treforest, Pontypridd.

Tenders, on the prescribed Forms, sealed and endorsed "Tenders for Gas-Stores, No. ——" (as the case may be), must be received by the undersigned on or before Monday, March 7, 1910.

The Council do not bind themselves to accept the lowest or any Tender.

J. COLENSO JONES,
Clerk to the Council.

Municipal Buildings,
Pontypridd, Feb. 19, 1910.

EXETER GASLIGHT COMPANY.

TENDERS FOR TAR.

THE Directors of the Exeter Gaslight and Coke Company invite TENDERS for such TAR as they may not desire to dispose of to persons others than Distillers, for Twelve Months from the 25th of March next, at per Ton of 20 cwt., delivered into Contractors' Tanks at the Company's Works.

Sealed Tenders, endorsed "Tender for Tar," will be received by the undersigned on or before Monday, the 7th of March next; but the Directors do not bind themselves to accept the highest or any Tender.

By order,
WM. N. WESTLAKE,
Secretary and Manager.

Gaslight Offices, Exeter,
Feb. 18, 1910.

RAMSGATE CORPORATION.

(GAS DEPARTMENT.)

TENDERS FOR SULPHURIC ACID.

THE Gas and Water Committee invite TENDERS for the Supply of about 225 Tons of Best BRIMSTONE ACID (what is known as 80 per Cent. Acid with a Specific gravity of 142° Twaddle), to be delivered in equal monthly Quantities between the 1st of April, 1910, and the 31st of March, 1911.

Tenders to be sent in not later than Noon on Tuesday, the 8th March, 1910, addressed to the Chairman of the Gas and Water Committee, Gas-Works, Boundary Road, Ramsgate, and endorsed "Tender for Sulphuric Acid."

The Committee do not bind themselves to accept the lowest or any Tender.

Further Particulars on Application to
WM. THOMSON,
Engineer and Manager.

Gas and Water Offices,
Boundary Road, Ramsgate.

COUNTY BOROUGH OF STOCKPORT.

(GAS DEPARTMENT.)

TENDERS FOR STORES.

THE Gas Committee are prepared to receive TENDERS for the Supply of GENERAL STORES for One Year from April 1, 1910, to March 31, 1911.

1—Bolts and Nuts.
2—Brushes.
3—Brass and Meter Fittings.
4—Cartage.
5—Iron Castings.
6—Drysaltery.
7—Retorts and Fire Goods.
8—Glass and Putty.
9—Iron and Steel.
10—Ironmongery.
11—Mill Furnishing.
12—Oils and Grease.
13—Tarred and Spun Yarn.
14—Shovels, Pick Heads, &c.
15—Timber, English and Foreign.
16—Tubing.
17—Wet and Dry Ordinary Meters.
18—Lime.

Forms of Tender and all further Information may be obtained on Application to the Engineer, Gas-Works, Portwood.

No Form of Tender other than that issued by the Committee will be accepted.

Sealed Tenders, endorsed "1," "2," "3," &c., as the case may be, must be addressed to the Chairman of the Gas Committee, and delivered at the Town Clerk's Office not later than Tuesday, March 15.

No Tender will be accepted without satisfactory proof that the Firm tendering pays the Trade Union Rate of Wages and observes the Trade Union number of hours usually paid and observed in the district where the Goods are made or produced.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
ROBERT HYDE,
Town Clerk.

Stockport, Feb. 25, 1910.

BOURNEMOUTH GAS AND WATER COMPANY.

ISSUE OF £10 SEVEN PER CENT. "B" SHARES.

MINIMUM PRICE OF ISSUE, £15 PER SHARE.

SALE BY TENDER OF 2019 £10, 7 PER CENT. "B" SHARES, in pursuance of the provisions of the Bournemouth Gas and Water Act, 1896.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER 2019 "B" SHARES of £10 each, (the Dividend of which is limited to £7 per cent.) to be paid up in full on or before the 31st of May, 1910.

The Capital now offered is required by reason of the Purchase of Freehold Properties at Alderney and Longham, and for the Extension of the Company's existing Works and Plant to meet the increased demand for Gas and Water by reason of the continuous development of the District supplied by the Company.

The Dividend on the Original Shares for the Half-Year ending the 31st of December, 1909, was at the rate of 10 per Cent. per annum, with an addition at the rate of 5 per Cent. per Annum under the Sliding-Scale, and on the "B" Shares at the rate of 7 per Cent. per Annum. Since the 30th of June, 1904, the Dividend on the Original Shares has been at the rate of 14 per Cent. per Annum, and, for the past Year, at the rate of 15 per Cent. The Net Profit earned in the Year ended the 31st of December, 1909, after deducting all charges, including Debenture and other Interest, amounted to £45,822 1s. 4d., exclusive of Interest on Reserve Investments, amounting to a further £701 8s. 2d., and after payment of Dividends to the 31st of December, 1909, the sum of £27,830 5s. 6d. remained to be carried forward to the current half-year.

Particulars and Conditions of Tender may be obtained at the Company's Offices, Bournemouth and Poole, or of the Secretary as under.

Sealed Tenders must be sent to the Secretary not later than Eleven o'clock on Thursday morning, the 17th of March, 1910.

By order, H. A. PLUMB, Secretary.

London: 90, Cannon Street, E.C.,
Feb. 18, 1910

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to MESSRS. A. & W. RICHARDS, at 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £12,500 THREE PER CENT. DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 15, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ROMFORD GAS AND COKE COMPANY, LIMITED.

NEW ISSUE OF 600 £5 "B" SHARES AND £2000 FOUR PER CENT. DEBENTURE BONDS.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 15, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Executors of A. G. Tilley, Esq., decd., and other Owners.
THE GASLIGHT AND COKE COMPANY,
£1000 CONSOLIDATED ORDINARY STOCK.
SEVENOAKS WATER-WORKS COMPANY,
£270 CONSOLIDATED STOCK.
MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY,
£900 CONSOLIDATED ORDINARY STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 15, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

Alteration in date of Sale.
By order of the Directors of the
HORNSEY GAS COMPANY.

NEW ISSUE OF £5000 CONSOLIDATED STOCK,
£6500 FIVE PER CENT. PREFERENCE STOCK,
AND
£3000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 22, at Two o'clock precisely, in Lots, instead of Tuesday, March 1, as previously announced.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

FOR SALE—50 Ordinary Shares in the SOUTH AFRICAN LIGHTING ASSOCIATION. Particulars on Application. Will accept £12 10s. each. Address No. 5199, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

Price 5s. 6d. Post Free.

REPORTS OF DISTRICT GAS ASSOCIATIONS FOR 1909.

London: WALTER KING, 11, Bolt Court, Fleet St., E.C.

HEATHCOTE GAS COAL
from the
GRASSMOOR COLLIERIES,
CHESTERFIELD.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

Just Published. Second Edition. Re-written. Enlarged. 8s. 6d. net.

ACETYLENE:
The Principles of its Generation and Use.
By F. H. LEEDS, F.I.C., F.C.S., Member of the Society of Public Analysts and of the Acetylene Association; and W. J. ATKINSON BUTTERFIELD, M.A., F.I.C., F.C.S., Consulting Chemist, Author of "The Chemistry of Gas Manufacture."
"Brimful of information."—*Chem. Trade Journal.*

Just Published. In Cloth. Illustrated. 12s. 6d. net.

THE GAS TURBINE
By HENRY HARRISON SUPLEE, B.Sc.
Prospectus is in preparation and may be had post free when ready.

LONDON: CHARLES GRIFFIN & CO., LIMITED, EXETER STREET, STRAND.

Testing Instruments
ALEXANDER WRIGHT & CO., LD.
WESTMINSTER.

BIRTLEY IRON COMPANY,
ESTABLISHED 1820,
Owners of the Birtley Iron Works and Pelaw Main Collieries,
GENERAL ENGINEERS & IRONFOUNDERS.

Makers of Cast-Iron PIPES and CONNECTIONS for Gas, Water, Steam, Electrical, Sanitary, and other purposes; also TANKS, COLUMNS of every description, Hydraulic, Gas, and Colliery PLANT, &c.

Illustrated Catalogue, giving complete list of our manufactures, on application.

Works: BIRTLEY, CO. DURHAM.
London Offices:
46, CANNON STREET, E.C.
Newcastle-on-Tyne Offices: MILBURN HOUSE.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER
Gas Engineers' Agents and Contractors for METERS, FIRE-CLAY GOODS, OXIDE OF IRON AND ALL OTHER GAS APPARATUS.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1906.

ARMSTRONG'S PATENT
CANDLE SAFETY LAMPS.

No. 1. No. 2. No. 3.
43, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

MIRFIELD GAS COAL.
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.

Please apply for Price, Analysis, and Report, to the
MIRFIELD COLLIERY COMPANY,
RAVENSTHORPE, NEAR DEWSBURY.
LONDON: 16, Park Village East, N.W.

TROTTER, HAINES, & CORBETT,
BRETTELL'S ESTATE, LIMITED,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: E. C. BROWN & CO., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
NEWTONGRANGE, MIDLOTHIAN.

ALL the
BOYS CALORIMETERS
which have been in daily use in all the Official Testing-Stations in London for the last Three Years
WERE MADE BY
JOHN J. GRIFFIN & SONS,
— LIMITED —
KINGSWAY, LONDON, W.C.

Those desiring to obtain Gas Calorimeters as used in the Official Testing Places should see that the apparatus bears the name of the Original makers.

Descriptive Catalogue on Application.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.
Manufacture and keep in Stock at their Works (also large Stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

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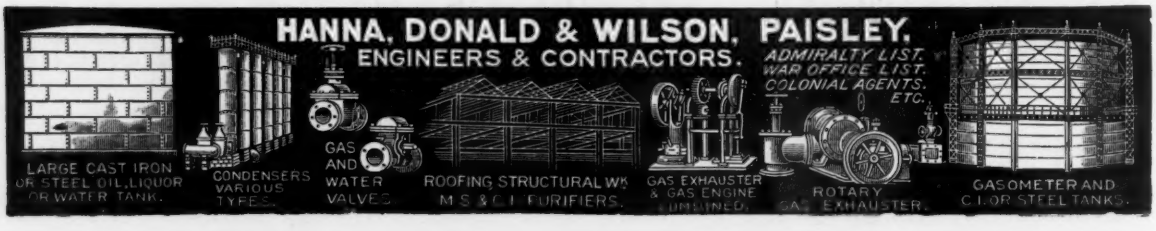
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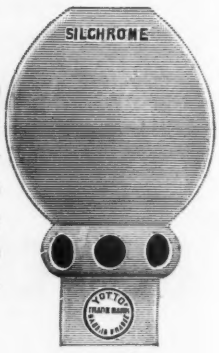

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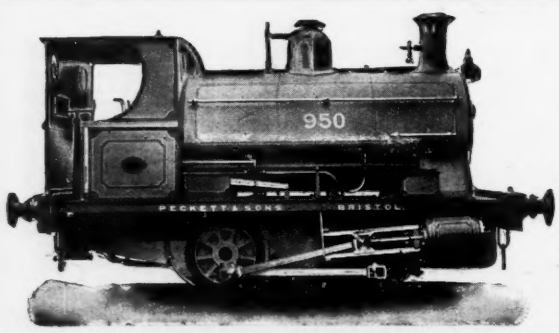

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2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

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1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

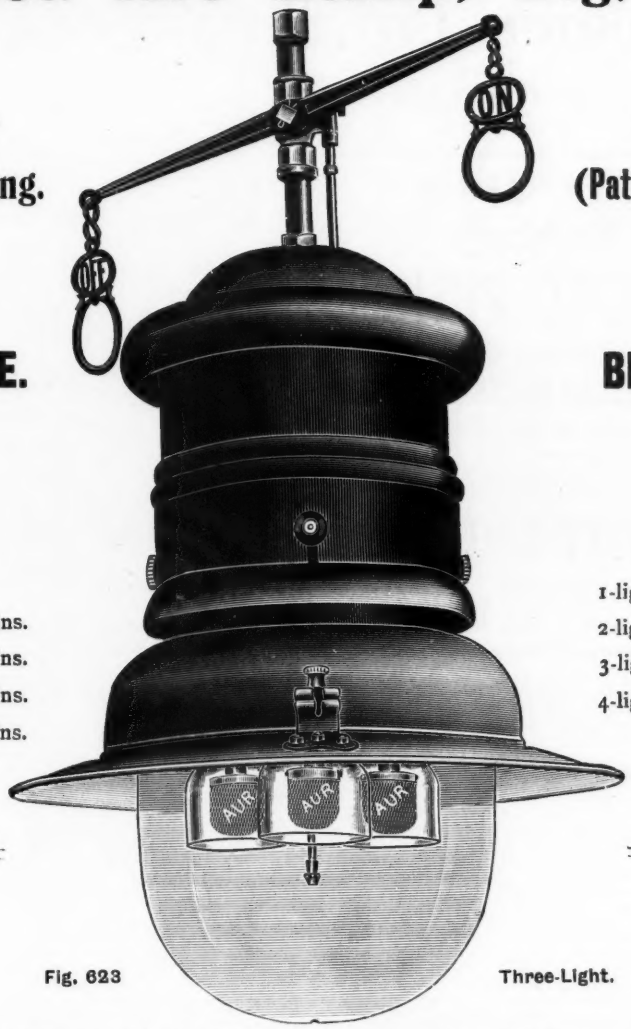

Fig. 623 Three-Light.

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2-light	8 feet	260	**47/6**	**6/-** extra.	4-light	16 feet	550	**72/6**	**9/-** extra.

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Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
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„ „ „ In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**
Case contains . .	*80*	*18*	*18*	*12*

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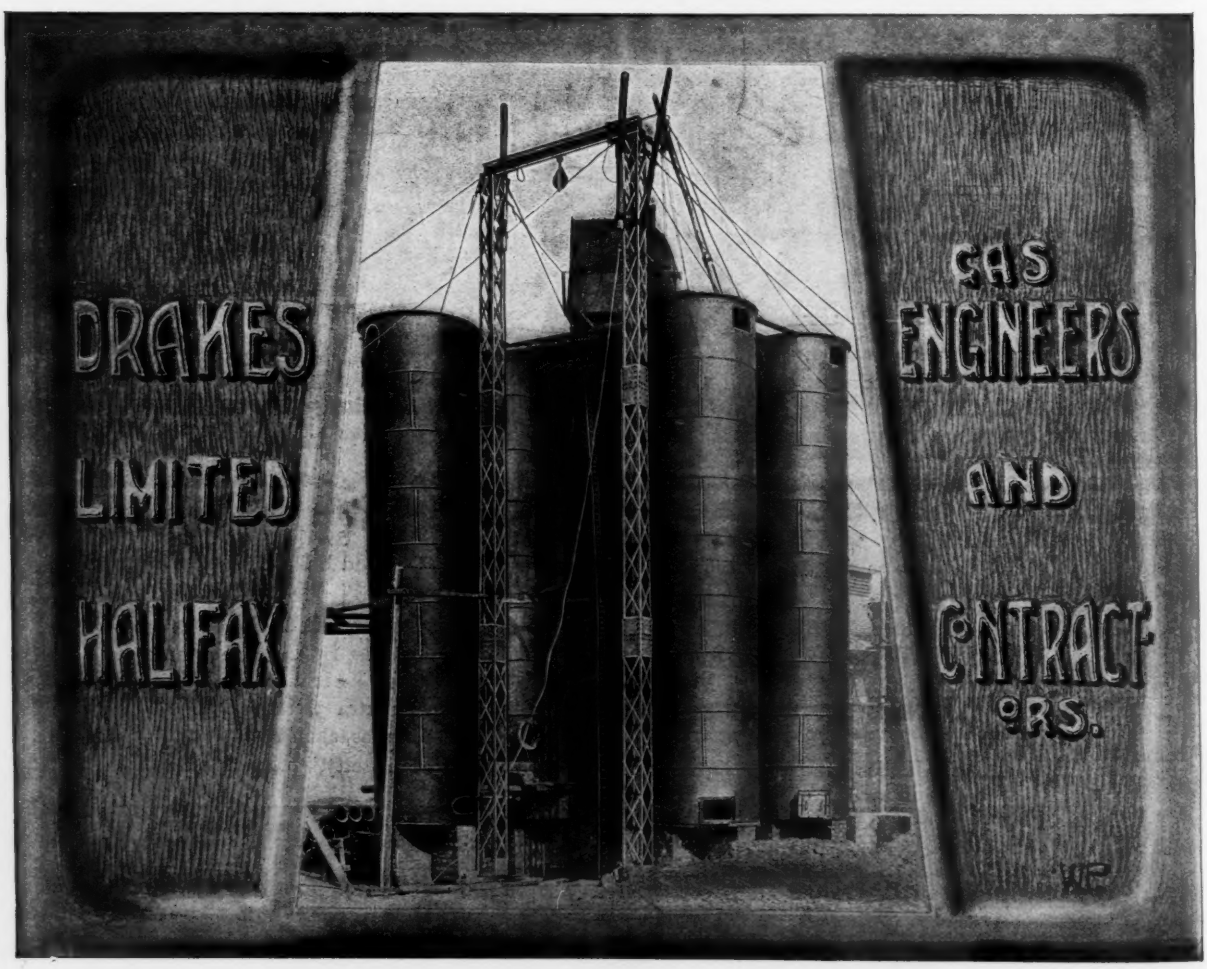

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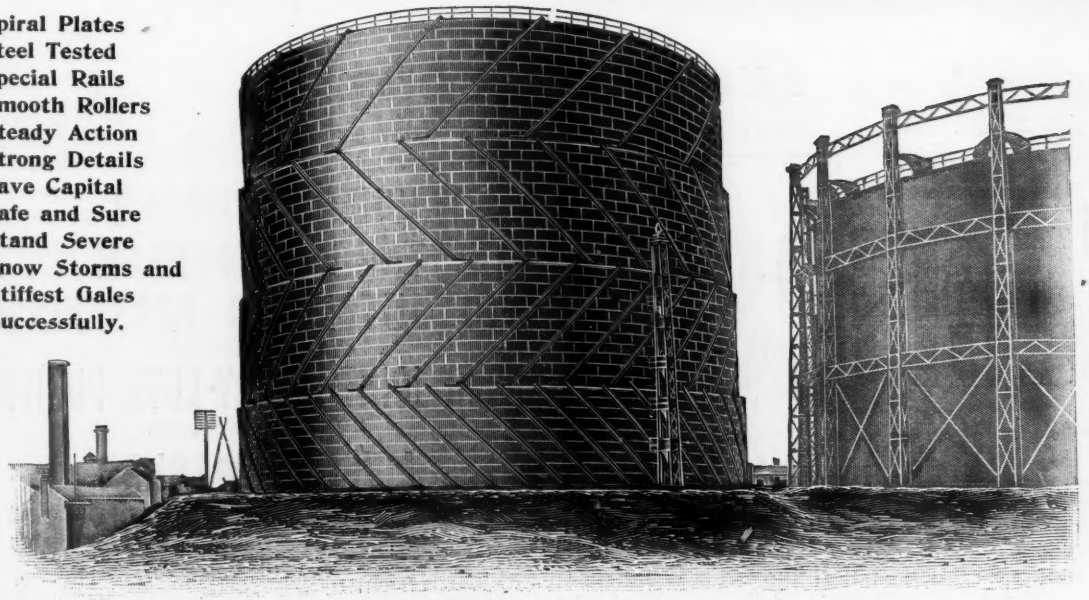

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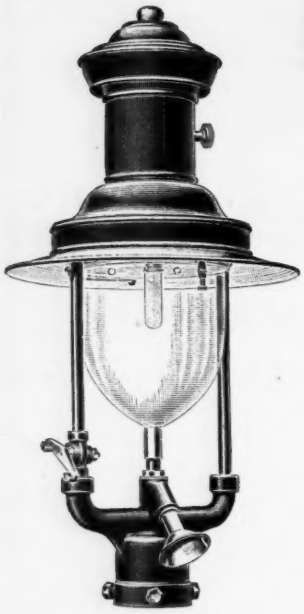

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